



GUIDANCE ON

Developing Mass Appraisal and Related Tax Policy

(Revised November 2023)



IAAO

INTERNATIONAL ASSOCIATION
of ASSESSING OFFICERS

Valuing the World

GUIDANCE ON DEVELOPING MASS APPRAISAL AND RELATED TAX POLICY

Revised November 2023

International Association of Assessing Officers

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. 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

The IAAO Guidance on Developing Mass Appraisal and Related Tax Policy Document Update Task Force Chair was Patrick Santoso. Members were Robert Gloudemans, Ben Bervoets, Gary McCabe, Su Yon Yeung and Staff Liaison Keith Robinson.

At the time of the 2023 revisions, the Research and Standards Committee comprised Margie Cusack, FIAAO, chair; Doug Warr, AAS, Vice-Chair; Patrick Santoso; Ben Bervoets; Melissa Baer, CAE; Alan Dornfest, AAS, FIAAO; Luc Hermans; Marco Kuijper; Shannon Lane; Carmela Quintos, Ph.D.; Michael Safarty; Kauser Taslim; Russ Thimgan; Errol Williams, Ph.D.; Carol Neihardt; Tyler Masterson; Josh Myers; and Shannon Hiss, RES, IAAO Staff Liaison.

Special thanks to Alan Dornfest, Margie Cusack, Carol Neihardt, and Melissa Baer are in order for their in-depth review and recommendations to bring this document to completion.

Published by
International Association of Assessing Officers 314 W. 10th St.
Kansas City, Missouri 64105-1616
816-701-8100 • Fax: 816-701-8149
www.iaao.org
Library of Congress Catalog Card Number: ISBN 978-0-88329-262-4

Copyright © 2023 by the International Association of Assessing Officers
All rights reserved.

No part of this publication may be reproduced in any form, in an electronic retrieval system or otherwise, without the prior written permission of the publisher. IAAO grants permission for copies to be made for educational use as long as (1) copies are distributed at or below cost, (2) IAAO is identified as the publisher, and (3) proper notice of the copyright is affixed.

Produced in the United States of America

CONTENTS

| | |
|--|-----------|
| 1. Scope | 1 |
| 2. Introduction | 2 |
| 2.1 Bases for Taxation | 2 |
| 2.2 Liability for the Property Tax..... | 5 |
| 2.3 Valuation and Taxation Principles | 5 |
| 2.4 Cost-benefit Considerations..... | 6 |
| 3. Supportive Legal Framework | 7 |
| 3.1 Current Market Value Standard..... | 7 |
| 3.2 Valuation Data – Sale Prices and Rental Income..... | 8 |
| 3.3 Reappraisal Cycle..... | 8 |
| 3.4 Enforcement..... | 8 |
| 3.5 Notification and Appeals (see also section 9)..... | 9 |
| 3.6 Controls on the Incidence of Property Taxation | 9 |
| 3.7 Title Registration | 9 |
| 3.8 Data Sharing..... | 9 |
| 4. Cadastral Maps, Property Identifiers and Records..... | 10 |
| 4.1 Importance of Cadastral Maps, Property Identifiers and Records, and Ownership Records | 10 |
| 4.2 Geographic Information Systems..... | 10 |
| 5. Market Data | 11 |
| 5.1 Sales Data..... | 11 |
| 5.2 Rent, Income, and Expense Data | 11 |
| 5.3 Cost and Depreciation Data | 11 |
| 6. Property Characteristics Data..... | 12 |
| 6.1 Selection of Property Characteristics Data..... | 12 |
| 6.2 Data Collection | 13 |
| 6.3 Maintaining Property Characteristics Data..... | 14 |
| 6.4 Alternative to Periodic On-site Inspections..... | 15 |
| 7. Valuation Using Mass Appraisal Modeling for Market Value | 16 |
| 7.1 Valuation Models..... | 16 |
| 7.2 The Cost Approach | 17 |
| 7.3 The Sales Comparison Approach | 17 |
| 7.4 The Income Approach | 18 |

| | |
|---|-----------|
| 8. Quality Assurance | 19 |
| 8.1 Model Diagnostics | 19 |
| 8.2 Ratio Studies (Analyses)..... | 19 |
| 8.3 Holdout Samples | 21 |
| 9. Appeals and Value Defense | 22 |
| 9.1 Appeals | 22 |
| 9.2 Value Defense..... | 22 |
| 9.3 Appeals System | 23 |
| 10. Transparency and Public Relations | 24 |
| 10.1 Importance of Transparency and Public Relations..... | 24 |
| 10.2 Documentation | 24 |
| 11. Management and Personnel | 25 |
| 11.1 Funding Property Tax Administration | 25 |
| 11.2 Management and Organization..... | 25 |
| 11.3 Personnel, Training, and Qualifications | 26 |
| 11.4 Hardware and Software Support for Mass Appraisal | 27 |
| Glossary | 28 |
| References | 37 |
| Suggested Reading | 38 |

GUIDANCE ON DEVELOPING MASS APPRAISAL AND RELATED TAX POLICY

1. SCOPE

This document, although not an IAAO Standard, was developed to provide guidance on developing mass appraisal systems from the collective experiences and lessons of valuation practitioners. The primary focus is on mass appraisal for value-based recurrent property taxes (also known as “rates on property”). However, the principles presented here are also relevant to mass appraisal for other governmental and public purposes.

As elaborated later, an effective market value-based property tax system requires the following components:

- Supportive underlying economic, legal, and administrative frameworks
- Accurate property characteristics and market data based on accepted standards
- Skilled valuers
- Effective valuation models
- Quality assurance
- Effective management
- Sufficient resources
- Appeals mechanisms
- Transparency.

Where mass appraisal is used for ad valorem property taxation, value definitions should be specified in law. Specific valuation methodologies may be required under different value definitions. Any such legal and specific valuation requirements supersede the direction in this guidance document.

The recommendations made in this document should be considered for implementation as practical. However, not all recommendations apply in every instance and mass appraisal can be successfully implemented even if some recommendations are not implemented.

Throughout this document, the terms *valuer*, *assessing officer*, *lister*, and *appraiser* may be used interchangeably. In addition, the terms valuation and appraisal are interchangeable and synonymous.

2. INTRODUCTION

Mass appraisal (valuation) is required when many properties need to be valued economically and en masse for a purpose such as annual property taxation. In addition to defensible and accurate values, fair and effective property taxation also requires programs that ensure all assessable properties are accounted for and that collection programs minimize the nonpayment of taxes. In addition, realistically sustainable tax rates that produce meaningful yields are needed. They need to be high enough to justify investment in effective assessment and collection systems, but not so high as to lead to low levels of acceptance and the need for multiple exemptions and discounts.

Mass appraisal is the process of valuing a group of properties as of a given date using common data, standardized methods, and statistical testing (IAAO 1990 chapter 5; Gloudemans 1999 chapter 5; and Gloudemans and Almy 2011 chapter 5). To determine a property's value, valuers rely upon valuation equations, tables, and schedules developed through analysis of market data. When market value is the goal, values for individual parcels should not be based solely on the sale price of a property. Instead, valuation schedules and models should be consistently applied to property data that is correct, complete, and current. This promotes fair and equitable valuation of all properties, not just those that have sold.

The development, construction, and proper administered of a computer-assisted mass appraisal (CAMA) system results in a valuation system that is kept current and is characterized by accuracy, uniformity, equity, reliability, transparency, and low per property costs. Guidance on common and recommended reappraisal cycles is found in **Section 3.3**. Except for specialized properties, individual analyses and appraisals of properties are not practical or necessary.

2.1 BASES FOR TAXATION

There are many bases for property valuation and taxation. These can be divided into two broad categories: value based, and non-value based. Value-based systems include market or capital value, rental value, business value, and use or productivity value. Non-value-based systems can be based on a fixed value per property based on area or other fixed formula. Some countries have both kinds of bases.

A market value system provides estimates of value that maximize uniformity, fairness, transparency, and understandability. Alternatively, an area-based system can provide a reasonable substitute when a market-based system is not practical due to lack of infrastructure, legal framework, or data. Market value can be determined only if there is a mature property marketplace and valuers have access to sales data.

2.1.1 Value Based Systems

The two main measures of value are capital value and annual rental value. When the standard of value is market value, capital value is the price that would be expected in an open market, arm's length sale. Annual rental value is the expected annual rent (or income). Annual value can be expressed on a gross or net basis. On a gross basis, the owner is assumed to be paying all operating expenses; on a net basis, the occupier is assumed to be paying (specified) operating expenses (such as repairs and insurance). Under either basis, actual rentals can be on a different basis, requiring valuers to make adjustments.

A standard of value other than market value based on highest and best use can be used. Such a standard can be current use value, insurance value, or acquisition price. In practice, when market value is not the basis, tax values usually are described as only accidentally reflecting market value patterns. That is, they simply result from the application of rules, base rates, and adjustment coefficients. Countries with advanced economies usually have systems that are at least nominally based on market values.

Each basis has advantages and disadvantages of a theoretical and practical nature depending on the nature of land tenure patterns and on other features of the property tax system. A country's property tax system can use more than one basis. For example, agricultural property can be taxed on a current use or soil productivity basis, while urban property is taxed on a market value basis. Indeed, property tax systems combine value and non-value bases and capital and annual value bases. The United Kingdom is an example of the latter: Residential property is taxed on a capital value basis, and nonresidential property is taxed on an annual value basis.

When market value is the basis for taxation, important issues include

- the rights to be valued
- the valuation (or assessment) date
- availability of sales data
- revaluation frequency.

Administration (particularly valuation) is simplified if it is assumed that the taxpayer possesses all private property rights (that is, excluding only the government's right of taxation). Fairness and certainty are served when the law specifies the effective date (or dates) for establishing ownership, property attributes, and value. There are two main ways for dealing with changes in ownership or physical characteristics after the assessment date. One is to ignore the changes until the next tax year. The other is for the assessment or collection agency to prorate taxes according to the fractions of the year before and after the change by issuing supplemental assessments or tax bills.

2.1.2 Non-Value-based Systems

The most common non-value property tax systems are those based on land area, building area, or both. Under an area-based property tax system, taxes are determined simply by multiplying a measurement of area by a rate. In general, area-based systems are suitable only as long as revenues are negligible.

Area-based systems have the advantage of being simpler to administer, since only property classification information and area measurements are needed. They are easier to implement because market data do not have to be collected and analyzed. There is no need for general reassessments. They also are more objective than value-based systems because area measurements are less contestable than value estimates. On the other hand, area-based property tax systems are quickly perceived to be less fair. Highly desirable properties may pay the same taxes as undesirable properties. Individual assessments bear little relationship to either ability to pay or benefits received, and this reduces public acceptance. These disadvantages of an area-based system can be lessened by the introduction of adjustment coefficients that reflect market factors. However, doing so reduces simplicity and objectivity. Although taxpayers might see this as an advantage, area-based property taxes are less buoyant than value-based systems.

2.1.3 Commentary on Value-based versus Non-Value-based Systems

If the goal is to provide a tax based on underlying property wealth, non-value-based systems are not appropriate or equitable. However, they may add elements of certainty, measurability, and uniformity that still enable a tax on property to be implemented.

In general, nations have indicated movement toward property tax based on market value. However, some countries' property tax is based on area rather than value.

Value does not necessarily imply market value. In some countries, for example, the basis can involve capitalized rent or fire insurance value. Other countries assign each residence to value bands (i.e., value ranges), based on decades-old prices. Lower value bands have lower nominal tax rates, but the system is generally regressive because every property in a band pays an equal amount of tax. In addition, most properties remain in their original bands despite any increase in prices since then. Two factors may account for the continued acceptance of the system: First, occupants are liable for the tax — not owners; second, the tax is perceived primarily as a payment for local services rather than a tax on property wealth.

2.1.4 Advantages and Disadvantages of Current Market Value

This document focuses on systems designed to attain current market value, whether on a capital or an annual (rental) value basis.

In a dynamic economy, property values change constantly. Values in one area may increase, whereas those in another may decrease or stabilize, resulting in a redistribution of property value. Only a system requiring current market value acknowledges these changes in market conditions and the distribution of property related wealth. Assessing property at current market value maintains a uniform relationship between actual property values and valuations made for property tax purposes. Also, current market value imposes an objective basis on what otherwise might be perceived as a highly subjective process.

Assuming sufficient market data are available, current market value is criticized primarily on the basis of an ability-to pay argument. It is often argued that if values are changed frequently or rise rapidly, tax increases will be unpredictable or overly burdensome, especially on those with fixed or limited incomes. From a public policy standpoint, however, if property taxes are a substantial burden, then systems in which property taxes increase in response to increasing values can be alleviated through targeted exemptions or other controls that decouple increases in value from increases in tax (at least on an overall basis).

A common, market-based alternative to current market value is infrequent reappraisal with little or no adjustment of values between reappraisals. Although values originally may have been market-based, they bear only coincidental relationship to current market values. This could mean a high degree of retained accuracy and uniformity when property values are stable. However, the opposite can be true, in which case equity and transparency of the tax and tax base are lost.

2.2 LIABILITY FOR THE PROPERTY TAX

Two systems for determining liability for taxation have been developed. One system holds that the thing that is taxed (the object) is itself liable (*in rem* taxation). Under this system, the property in question can be confiscated to secure overdue tax obligations and the owner is only nominally the taxpayer. Designating nonowners as taxpayers is incompatible with *in rem* enforcement.

Under the more common *in personam* taxation system, the person designated as taxpayer is liable. *In personam* liability is the most appropriate choice when occupants are taxpayers. Under *in personam* systems, property owners, occupants, or both can be deemed to be responsible for paying taxes. Under *in personam* liability, the taxpayer must be found before arrears (delinquencies) can be enforced.

2.3 VALUATION AND TAXATION PRINCIPLES

Both valuation and taxation programs need to be visible and transparent and include controls on the incidence and burden of property taxes. The same principles apply when mass appraisal results are used for purposes other than taxation, for example, mortgages or property insurance.

Visibility and Transparency

The workings of a property tax system should be visible to taxpayers. This means that the taxes being generated by the system should clearly be tied to the taxing units of government that use this funding source. Overall increases or decreases in property taxes thereby become a function of the changing needs of these units of government separate from the assessing officer's role, which is only to determine the proper distribution of the tax.

Mass appraisal values and the general methodology underlying them should be available and lend themselves to explanation. The basis of valuation, including mathematical models and statistics that measure the quality of values, should be available.

2.3.1 Property Appraisal versus Property Tax

One of the most common misunderstandings about the property tax, especially in a current-market-value-based system, is the supposition that the tax is strictly value driven. This implies that a 10% increase in appraised value must translate into a 10% increase in tax. If true, this result may lead to a disincentive to implement mass appraisal generated values and to infrequent reappraisal.

By appraising property equitably and uniformly and in accordance with legal guidelines, the property tax administrator ultimately is responsible for the distribution of the property tax burden, not the magnitude of the tax. For example, if the market value of waterfront lots doubles, but the value of all other property in the jurisdiction remains constant, these lots will bear a higher proportional share of the total property tax for the jurisdiction and, conversely, other properties will bear a lower proportional tax burden. That is the principle of *ad valorem* taxation at work. It is possible, if the system is rate-driven — meaning that the tax rate is fixed — the increase in value will translate directly into higher taxes, raising the total tax charged, not just the share levied against the lakefront lots. In contrast, in a budget-driven system, meaning the tax rate is calculated as the taxes to be raised divided by the total assessed value, higher values force rates downward and offset rising assessments. In this type of system, increases in the total amount of property tax result only from increases in budgets submitted and approved by taxing jurisdictions. This is the preferred model.

2.4 COST-BENEFIT CONSIDERATIONS

The object of mass appraisal is to produce equitable valuations at low administrative costs. Improvements in equity often require increased expenditures. Cost-benefit analysis in mass appraisal involves both policy and administrative issues.

2.4.1 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 legal requirements and applicable performance standards.

2.4.2 Administrative Issues

Maximizing equity per unit of expenditure is the primary responsibility of assessment administration. To maximize productivity, the assessor and managerial staff should 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.

2.4.3 Frequency of Reappraisal

The quality of valuation estimates deteriorates over time, with annual, followed by biennial, valuation affording maximum accuracy. If valuation models are not updated annually, adjusting values by property type and location based on sales ratio or related analyses can help maintain accuracy. All properties should be reappraised at least every four to six years. Reappraisal may need to be more frequent when indicated by worsening statistical quality measures developed from ratio studies.

2.4.4 Multipurpose Value and Cadastral Data

One way to increase the return on investments in valuation systems and cadastral databases is to use the data in multiple ways. One example is the use of estimated market values for transfer taxation, which is especially appropriate when people frequently under declare actual sale prices. Market value can also be used in net wealth taxation, in capital gains taxation, and in imputing the income derived from owner-occupied property. Other uses include mortgage finance, fire insurance, and expropriation (eminent domain).

3. SUPPORTIVE LEGAL FRAMEWORK

Internationally, there are two main legal systems: common law and civil law. They influence both property rights and the characteristics of property tax laws. The main distinction between the two systems is the relative importance of codified texts of laws versus judicial precedents. Under a civil law system, greater weight is placed on organized written legal texts or codes. Under common law, greater weight is attached to court decisions.

3.1 CURRENT MARKET VALUE STANDARD

To maximize fairness and understandability in a property tax system, assessments should be based on current market value of property, and this principle should be supported in legislation.

Important issues are:

- Rights to be valued and other valuation assumptions
- Valuation (or assessment) date
- Revaluation frequency.

Administration (particularly valuation) is simplified if it is assumed that the taxpayer possesses all private property rights (i.e., excluding only the government's right of taxation) or otherwise all private rights that are commonly transferrable on the real estate market. Fairness and certainty are served when the law specifies the date (or dates) as of which ownership, property attributes, and value are reflected in assessments.

In dynamic real estate markets, revaluations provide fairness and revenue buoyancy. In theory, each year's property tax obligation bears a predictable relationship to the current value of the property (i.e., effective tax rates are approximately equal). This objective is best achieved with annual reassessments (followed by biennial reassessments). Although not best practice, revaluations on a fixed cycle (e.g., every four or five years) are common and preferred over an occasional revaluation, as the latter may lack legitimacy and allow inequities to exacerbate.

An annual assessment program does not require that every assessment be changed every year. Assessments need to be changed only when a property has physical or use changes. When there is a clear indication based on market evidence that valuations no longer meet level and uniformity standards, assessments need to be updated. This approach requires tax administrators to update the property inventory on an ongoing basis, continually monitor market trends, and update values as necessary. Value updates can be accomplished through indexing, recalibrating existing valuation models, or developing and applying new valuation models, depending on the approach warranted in the circumstances.

Changing from occasional revaluation projects to an annual reassessment program offers major benefits. Most important, by maintaining accurate, up-to-date valuations, tax burdens are proportional. Changes in the composition of the tax base are more gradual and may moderate political opposition to revaluations. The annual costs of an ongoing reassessment program compare favorably with the annualized costs of periodic revaluations. The value of having an up-to-date property database is an additional benefit.

3.2 VALUATION DATA – SALE PRICES AND RENTAL INCOME

The legal framework should facilitate the acquisition of the data needed in assessment and valuation, as detailed in **Sections 5 and 6**. That is, owners, occupants, and other market participants should be required to disclose necessary details. Ideally, legal provisions include mandatorily allowing access to properties for inspection by the assessment officials. Mechanisms for sharing information between governmental agencies receiving or managing information should promote the availability of up-to-date data. Similarly, if high transfer or other taxes discourage reporting of correct prices, alternate verification systems may be needed. Ultimately, the accuracy of reported sales prices is inherent to the quality and acceptability of assessed values, provided sale price is the basis for value. Similarly, if annual rental income is used to determine the assessed value, controls must be in place to ensure the accuracy of that information. Deterrents to registering ownership or occupancy changes or to disclosing actual prices should be eliminated (see Bahl 2009 iv-vi; Norregaard 2013 35). If accuracy of sale prices or rental income data remains in question, alternate data, such as asking prices or rents, may be considered.

3.3 REAPPRAISAL CYCLE

Current market value implies annual assessment of all property. In annual assessment, the assessing officer should reevaluate the factors that influence value, and use mass appraisal techniques to estimate property values. Thus, it is necessary to observe and evaluate, but not always to change, the assessment of each property each year in order to achieve current market value. In the absence of annual assessment, it is recommended that assessing officers consider establishing regular reappraisal cycles or at least appraisal level and uniformity (vertical and horizontal equity) thresholds that trigger reappraisal (see *Standard on Ratio Studies* [IAAO 2013c]). Each of these issues should be addressed in the underlying legal framework, which should include requirements for a frequent verification of registered property characteristics, for example through a reinspection at least every four to six years.

3.4 ENFORCEMENT

The legal framework should incorporate laws that provide for a supervisory or control function when overall responsibility for property tax administration is divided among different agencies and tiers of government. Without supervision, some agencies or units of government may fail to carry out their responsibilities properly. When these agencies have responsibility for assessment and have considerable latitude in setting tax rates and granting exemptions and relief, safeguards are needed to prevent under-assessment or under-taxation of property. In addition, it is important to institute checks and balances sufficient to detect or preclude corrupt practices, which may otherwise develop or persist.

Supervisory agencies should be responsible for activities including the following:

- Developing standards
- Setting standards and specifications
- Assisting and counseling assessors and other property tax officials
- Monitoring their performance and making other analyses
- Enforcing laws and regulations, including equalization.

3.5 NOTIFICATION AND APPEALS (SEE ALSO SECTION 9)

Laws should provide for taxpayer value notification, at least when taxable values change, but, preferably, annually. Valuation notices should include information on how taxpayers may appeal if they disagree with the value.

Appeals are an important part of the property tax assessment process because it provides an opportunity for challenge and, where appropriate, change.

In general, appeal processes have a number of hierarchical steps. At the lowest level, the tax administration agency, an independent body, or both can hear appeals. As appeals are taken to higher levels, the hearing body has broader geographic jurisdiction. At the highest level, appeals are to the courts. It is recommended to have some form of informal appeal procedure to rectify obvious errors without the need for a formal procedure.

3.6 CONTROLS ON THE INCIDENCE OF PROPERTY TAXATION

Legislative bodies often provide measures to shift the property tax from certain groups of taxpayers. Such measures nearly always increase the property tax on non-favored groups and generally should be limited. Property tax agencies should study legislation to determine its effects on tax incidence and burden. Failure to understand the effects of tax-shifting measures results in increased complexity of controls. The true effect becomes lost and may even shift more taxes to favored groups. Typical controls include full or partial exemptions, abatements, deferrals, and tax credits or grants. When properly established, these controls create an effective safety net protecting those most at risk from disproportionate value-change-related tax increases. Controls should be tailored to meet specific needs of the economic, taxpaying, and political system.

3.7 TITLE REGISTRATION

Title registration commonly is combined with surveying and mapping. Surveying agencies also can be responsible for valuation. However, separating property tax-related activities, such as property attribute data collection and valuation, from activities related to title registration lessens the negative effects of buyers believing that one of the “costs” of title registration is property taxation. When they believe this, they have an incentive not to register ownership changes and to conceal the true nature of transactions, especially sale prices.

3.8 DATA SHARING

Legislation and intergovernmental provisions should allow data to be shared between assessing agencies and other users. For example, real estate agents and developers use sales information and de-scription of improvements. Financial institutions may use similar information already collected by assessors. Despite the need to facilitate these uses, privacy safeguards are necessary and may extend to income and expense data.

4. CADASTRAL MAPS, PROPERTY IDENTIFIERS AND RECORDS

4.1 IMPORTANCE OF CADASTRAL MAPS, PROPERTY IDENTIFIERS AND RECORDS, AND OWNERSHIP RECORDS

To ensure that all properties (parcels and occupancy units) are accounted for, valuers must maintain or have access to accurate, up-to-date cadastral maps that cover the entire jurisdiction and that include a unique identifier for each parcel or property. Where available, a street address and legal description should be included to establish the location and boundaries of the parcel. The parcel identifier should be included not only in the parcel data but also in any parcel-related data such as liens or mortgages. Ownership data are required to establish legal ownership of the property for liability and other purposes. Ownership records should comprise the name(s) of the registered owner(s), or occupants, and their contact information, such as street address. These records should include ownership of subsurface rights, if applicable.

While some counties have sound property records and ownership data, others lack this important cornerstone. Governments and taxpayers alike should recognize the importance of this basic information in establishing an effective property tax and local government financial system. Government agencies who are in doubt should check rather than simply assume that the necessary infrastructure is in place and the maintained information is fundamentally accurate. Inaccurate data will lead to ownership and valuation errors, taxpayer dissatisfaction, and inability to establish a sound property tax.

4.2 GEOGRAPHIC INFORMATION SYSTEMS

Cadastral maps are especially useful in mass appraisal when they constitute part of a geographic information system (GIS). A GIS permits graphic displays of sale prices, assessed values, inspection dates, land uses, and much more. In addition, a GIS permits high-level analysis of nearby sales, neighborhoods, and market trends.

However, the power of GIS will be lost or even misused if the parcel boundaries, identifiers, and other information it incorporates are incorrect. If in doubt, a good first step is to check the polygons contained in GIS shape files by layering them over satellite images. Buildings, roads, waterways, fencing and other natural boundaries can be used for comparison.

It should also be noted that, for national defense or other reasons, land surface data and images may be sensitive or confidential. Custodians of the information should, of course, recognize these requirements while not compromising its accuracy.

For additional information on cadastral maps, parcel identification systems, and GIS, see the Standard on Manual Cadastral Maps and Parcel Identifiers (IAAO 2004), Standard on Digital Cadastral Maps and Parcel Identifiers (IAAO 2012), Procedures and Standards for a Multi-purpose Cadastre (National Research Council 1983), and GIS Guidelines for Assessors (URISA/IAAO 1999).

5. MARKET DATA

In a value-based property tax system, sufficient market data (rents, sale prices, or both) are crucial to accurate values. Without such data, accurate values are not possible. Public disclosure of sales data is a good first step in this regard. If sales data is not disclosed valuers should seek to discover the necessary data from other sources. It is also important that valuers screen market data to ensure that data used in analyses represents open market transactions representative of the current market.

5.1 SALES DATA

Especially in a capital-value system, a file of sales data should be maintained. Sales data are required in all applications of the sales comparison approach, in the development of market-based depreciation schedules in the cost approach, and in the derivation of capitalization rates or discount rates in the income approach. Refer to Property Appraisal and Assessment Administration IAAO 1990, Chapter 5; Gloudemans and Almy 2011, Chapter 2; and the Standard on Verification and Adjustment of Sales (IAAO 2020) for guidelines relating to the acquisition and processing of sales data.

5.2 RENT, INCOME, AND EXPENSE DATA

In an annual value system, a system for acquiring and storing rental and lease information should be maintained. In a capital value system, income and expense data should be collected for income-producing property, as these data are required in the application of the income approach to value (see *Standard on Mass Appraisal of Real Property* [2017, Section 3.5.]) Refer to Property Appraisal and Assessment Administration (IAAO 1990, Chapter 5) and Gloudemans and Almy (2011, Chapter 2) for guidelines addressing the collection and processing of income and expense data.

5.3 COST AND DEPRECIATION DATA

Current cost and depreciation data adjusted to the local market are required for the cost approach (see *Standard on Mass Appraisal of Real Property* [2017, Section 3.6]). Cost and depreciation manuals and schedules can be purchased from commercial services or created in-house including necessary indexes to trend cost to the assessment date. Regardless of source, cost data should be sufficiently detailed so as to represent the different construction materials and techniques used in the local market and should recognize significant cost differences that may exist between geographic areas, See Gloudemans and Almy (2011, Chapter 4) for guidelines on creating manuals and schedules.

6. PROPERTY CHARACTERISTICS DATA

6.1 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
- Published and accepted data standards

Determining what data on property characteristics to collect and maintain for a CAMA system is a crucial decision with long-term consequences. Data collection and maintenance are usually the costliest aspects of a CAMA system. Collecting data that are of little importance in the valuation 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 or unreliable, a major data collection program is likely required.

The following lists describe important characteristics for three common property types.

Residential property characteristics:

- Type of dwelling (detached, row, terrace, apartment, etc.)
- Living area, calculated using an accepted building measurement standard
- Construction quality or key components thereof (style or design, exterior wall type, etc.)
- Effective age or condition
- Secondary areas such as basements, garages, or balconies
- Land size in the case of detached structures
- Available utilities (sewer, water, electricity)
- Market area, zone, or neighborhood
- Location amenities, such as water frontage
- Location nuisances, such as heavy traffic

Commercial property characteristics:

- Property type or use
- Size
- Location
- Construction quality
- Effective age or condition
- Ratio of land area to the main floor area.

Unimproved land characteristics:

- Permitted use or zoning
- Plot size
- Plot shape and usability
- Location
- Available services

6.2 DATA COLLECTION

A 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 in achieving accurate and consistent data collection. The data collection program should result in complete and accurate data.

6.2.1 Initial Data Collection

A physical inspection is the best way to obtain initial property characteristics data and, at a minimum, should include a comprehensive exterior inspection. However, there are several data collection options:

1. Use of previously captured data (data conversion)
2. Field canvasses
3. Targeted inspections (properties with building permits, sold properties, properties under appeal)
4. Imagery (e.g., aerial, oblique, and street level photography)
5. Returns submitted by property owners or taxpayers.

Physical inspection should be performed either by valuers or by trained data collectors. Depending on the data required, an interior inspection might be necessary. In some cases, owner-provided property information or third-party sources can be used.

6.2.2 Data Collection Format

Data should be collected in a prescribed format designed to enable both the collection of data in the field and entry of the data into the computer system.

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 type of room, stairway, storage space, utility area, etc.). 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 properties, and other property types.

6.2.3 Data Collection Manuals

A clear, thorough, and precise data collection manual is essential and should be developed, updated, and maintained. Data collection staff should be trained in the use of the manual and related updates to maintain consistency. The manual should contain guidelines for personal conduct during field inspections, and if interior data are required, it should outline procedures to follow when the property owner has denied access or when entry might be risky. It should reference the use of an accepted building measurement standard.

6.2.4 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 5%. All building areas and story heights should be labeled based on standard descriptions from the data collection manual. If areas, dimensions, or volumes must be estimated, the property record should note where quantities are estimated.
- For each objective, categorical, or binary data field to be collected or verified, at least 95% 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. For 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% of the time. Subjective categorical data characteristics include data items such as quality grade, physical condition, and architectural style.

6.2.5 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 samples of 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 fails to meet quality control standards should be re-collected.

The accuracy of subjective data should be judged primarily by conformity with written specifications and examples in the data collection manual. Subjective data judgments can be substantiated by field notes if necessary. See the Standard on Data Quality for additional guidance.

6.3 MAINTAINING PROPERTY CHARACTERISTICS DATA

Data collection does not stop when all the properties in the jurisdiction have been visited or viewed. Periodic physical review (IAAO Standard on Mass Appraisal of Real Property [2017, Section 3.3.4] recommends every four to six years to maintain an accurate and current inventory. Building permits do not catch all changes in property characteristics, especially those related to property condition. The review can be a careful drive-by of properties in the area to look for signs of change,

a systematic scrutiny of oblique aerial photographs, or a careful review of trusted on-line websites with current photographs. Unreported improvements should be noted, and steps should be taken to bring assessment records up to date.

Data maintenance tasks should be optimized to minimize the number of trips to the field. Work can be organized geographically and scheduled near the assessment date to eliminate repeat trips to check on partial construction as of the legal assessment date

In areas that do not have effective building permit systems, aerial photographs are another way to spot new construction. Comparison of property records against aerial photographs can identify unreported improvements. Some computerized oblique aerial photography applications can compare images of the same area or property at different times and highlight new improvements, for example, a new garage or pool. It may also be feasible to determine type of structure, approximate square footage, and other improvements or features from the photographs. Aerial photographs are particularly effective in rural areas where improvements are hard to see from the road.

6.4 ALTERNATIVE TO PERIODIC ON-SITE INSPECTIONS

Provided that an initial physical inspection has been completed — and the requirements of a well-maintained data collection and quality-management program have been achieved — jurisdictions may employ a set of digital imaging technology tools to supplement field inspections with a computer-assisted office review. These imaging tools can include the following:

- Current high-resolution street-view images that enable quality grade and physical condition to be verified
- Orthophoto images updated at least every two years in rapid-growth areas, or at least every five years in slow-growth areas to identify new buildings or alterations
- Oblique aerial photographic images capable of being used for measurement verification, up-dated at least every two years in rapid-growth areas, or five years in slow-growth areas.
- A review of on-line market listing websites with current photographs to verify interior layouts or conditions or show where improvements may have been made.

Some systems rely on well-designed taxpayer declarations, greatly reducing the need to send inspectors into the field.

Effective tool sets validate CAMA data and incorporate change detection techniques that compare building dimension data (footprints) in the CAMA system to geo-referenced imagery or remote sensing data and identify potential CAMA sketch discrepancies for further investigation.

If feasible, valuers should visit assigned areas on an annual basis to observe changes in neighborhood condition, trends, and property characteristics. An onsite 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 affected properties that have significant change should be inspected when work is complete.

7. VALUATION USING MASS APPRAISAL MODELING FOR MARKET VALUE

There are a wide variety of mass appraisal systems. This document focuses on systems that employ valuation models that simultaneously consider the effects of several factors on values. **Section 7.1** provides an overview of valuation models. **Sections 7.2** through **7.4** discuss the three approaches to value (cost, sales, and income) and requirements for successful application.

7.1 VALUATION MODELS

A mass appraisal model is a representation, in words, a schematic, 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 appraisal valuers first specify the model, that is, identify the variables (supply and demand factors) that may influence value and may specify mathematical conversions, such as logarithms, often used to transform nonlinear data. At the same time, they specify the mathematical form of the model. Linear (additive), multiplicative (log-linear), and hybrid (nonlinear) forms may be used. Then, mass appraisal valuers calibrate the model, that is, determine the adjustments or coefficients that best represent the value contribution of the variables chosen. Multiple regression analysis (MRA) is the most common calibration tool. Careful and extensive market analysis is required for both specification and calibration of a model that estimates values accurately. Mass appraisal modelers may also utilize machine learning techniques.

When residential property is being valued, geographic stratification is appropriate when the value of property attributes varies significantly among areas. It is particularly effective when housing types and styles are relatively uniform within areas. Separate models can be developed for market areas (also known as economic or model areas). Along with building and location attributes, subareas or neighborhoods can serve as variables in modeling. They can also be used in land value tables and selection of comparable sales (see Gloudemans and Almy 2011). 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, office, warehouse/industrial, and retail properties. Large jurisdictions may be able to stratify properties further by type or geographic area.

7.2 THE COST APPROACH

Reliable cost data are imperative in any successful application of the cost approach. 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. Costs of individual construction components and building items should also be included in order to adjust for features that differ from the base specifications. These costs should be incorporated into construction cost manuals and related computer software. Construction cost schedules can be

- Developed internally, based on a systematic study of local construction costs
- Obtained from private firms that aggregate cost information
- Custom-generated by a contractor.

Cost schedules should be verified for accuracy by applying them to recently constructed improvements of known cost and should be updated before each assessment cycle.

The estimation of accrued depreciation can be based on non-cost data (primarily sales), for example, by plotting building residuals (sales prices less land values) divided by Replacement Cost New (RCN) against building age or effective age. Land value should also be estimated from sales (including sales of improved property when sales of vacant land are scarce). Land values used in the cost approach must be current and consistent.

7.3 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. Recent sales can be supplemented with older sales provided they are adjusted for price changes to a common valuation date (see Gloudemans and Almy 2011, pp 147-166).

Applications of the sales comparison approach include direct market models, often based on multiple regression, and comparable sales algorithms. Machine-learning has also proven its ability to estimate prices accurately and presents another tool for mass appraisal modelers with the necessary understanding and analytical skills.

Before being applied, the models or algorithms should be tested using sales ratio analysis or other methods. Users of comparable sales algorithms should consider 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 (IAAO 2013c). Because machine-learning is susceptible to over-fitting, it should always be tested and validated on holdout samples.

7.4 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 rental income, expense data, and income multipliers.

Mass appraisal applications of the income approach begin with collecting and processing income and expense data. The collected data are then analyzed to determine typical figures. The developed income figures can be capitalized into estimates of value in a number of ways. For example, 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, direct capitalization rates, or yield capitalization rates can be developed and applied to estimated net incomes. Whenever possible, these multipliers and rates should be extracted from actual income and sale price data obtained from properties that have sold. When insufficient sales are available, capitalization rates can be developed through “indirect” methods involving an analysis of required rates of return on and of investment.

In annual rental value systems, direct comparison methods analogous to those used in the sales comparison approach are used to estimate market rents based on samples of observed rents.

8. QUALITY ASSURANCE

Model testing and quality assurance measures that provide feedback on the reliability of valuation models and the overall accuracy of estimated values are an essential component of the mass appraisal process. It is important for modelers and assessors to be familiar with these diagnostics so that they can evaluate valuation performance properly and make improvements where needed. In addition, there should be an independent review procedure incorporating an audit of final values to ensure accuracy, uniformity, and consistency.

8.1 MODEL DIAGNOSTICS

Modeling software contains various statistical measures that provide feedback on model performance and accuracy. Multiple regression 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 should understand these measures and ensure that final models both make appraisal sense and are statistically sound.

8.2 RATIO STUDIES (ANALYSES)

Regardless of how values were generated, ratio studies provide objective, bottom-line indicators of assessment performance. The IAAO literature contains extensive discussions of this important topic, and the IAAO Standard on Ratio Studies (2013c) provides guidance for conducting a proper study. It also presents standard International Association of Assessing Officers for key ratio statistics relating to the two primary aspects of valuation performance: level and uniformity. The discussion below summarizes these standards and describes how the valuer can use sales ratio metrics to help ensure accurate, uniform values.

8.2.1 Value Level

Value level relates to the overall or general level of capital or rental values of a jurisdiction and various property classes, strata, and groups within the jurisdiction. It is important that each group be assessed at market or rental value as required by professional standards and applicable laws, rules, and related requirements. Three common measures of central tendency in ratio studies are the median, mean, and weighted mean. The median ratio should be between 0.90 and 1.10. Reliability statistics provide important indicators for determining whether the standard has not been achieved for a property group. Current, up-to-date valuation models, schedules, and tables help ensure that value levels meet required standards. Where properties are not revalued annually, values can be statistically adjusted between reappraisals to ensure compliance.

8.2.2 Value Uniformity

Value uniformity relates to the consistency and equity of values. Uniformity has several aspects, the first of which relates to consistency in value levels between property groups. It is important to ensure, for example, that residential and commercial properties are appraised at similar percentages of market value and that residential value 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 level of appraisal for each major group of properties should be within 5% of the overall level for the jurisdiction. Confidence measures and tests can be conducted to determine whether one can conclude from ratio data that the standard has not been met.

Another aspect of uniformity relates to the consistency of value levels within property groups. There are several such measures, the most 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 (rental) ratios on thematic maps.

The following standards are recommended for the COD:

- Single-family homes and condominiums: CODs of five to 10 for newer or similar residences and five to 15 for older or more heterogeneous areas
- Income-producing properties: CODs of five to 15 in larger, urban areas and five to 20 in other areas
- Vacant land: CODs of five to 15 in very large areas with active markets, five to 20 in large to mid-size areas with slower development, or five to 25 in rural, agricultural, or seasonal recreation areas
- Rural residential, seasonal, and manufactured homes: CODs of five to 20
- Rural vacant land with little development: CODs of five to 30.

It is important for the entire appraisal staff to be trained in, aware of, and actively monitor compliance with these standards and take corrective action where necessary. Poor uniformity within a property group is usually indicative of failure to properly identify property characteristics that influence market value, 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 lower and higher value properties. Although there are statistical subtleties that can bias evaluation of price-related uniformity, several tests can provide useful information about the existence and extent of this type of bias. The most relevant measures are the price-related differential (PRD) and coefficient of price-related bias (PRB).

The PRD provides a simple gauge of price-related bias. The PRD should be between 0.98 and 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 are doubled or halved. For example, a PRB of $-.03$ would mean that assessment levels fall by 3% when value doubles. The PRB should range between -0.05 and $+0.05$ for the jurisdiction, each major property class, and residential market areas. PRBs outside the range of -0.10 to $+0.10$ are considered unacceptable.

Because price is observable only for sold properties, there is no easy correction for price-related bias, 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 lower value properties. Additional stratification may also be indicated.

8.3 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 models will provide reliable results for the range of properties that must be valued (holdout samples of 10% to 25% are typical). If too few sales are available, later sales can be validated and used for the same purpose. 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 values or changing model-determined values closer to sales prices, for example, might produce sales ratios statistics that appear excellent but are not representative of broader performance for the population of properties. Machine-learning techniques are prone to over-fitting data and like 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, 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.

9. APPEALS AND VALUE DEFENSE

9.1 APPEALS

Value appeals are an important component in the assessment process. Appeals provide an opportunity for taxpayers to meet with the assessor to inquire about their values and to learn about assessment and appeal procedures. In the case of disputes about values, an appeal system should provide opportunities for both informal meetings with the assessor and formal hearings before independent bodies to resolve disputed issues and thus assure the public that values are correct, fair, and equitable.

Physical inspections of properties under appeal can often resolve data challenges or inform changes in environmental conditions. On-site inspections also can defuse taxpayer concerns about data credibility or assessor objectivity.

Laws should provide for an open and transparent process that allows for formal appeals beyond the assessor's level (Standard on Assessment Appeal [IAAO 2013a]). Key components of any appeal system include a clearly written set of procedures that provide due process.

9.2 VALUE DEFENSE

Values resulting from properly applied mass appraisal models should be considered valid value estimates. However, they should also be subject to review and appeal. Underlying laws should recognize the legitimacy of mass appraisal values and specify an appeals process.

The assessor's 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 property, its characteristics, and its calculated value. Properties 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 sale price 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. The professional staff should also be prepared to support individual valuations as required, preferably through comparable sales that are typically easier to explain than mass-appraisal market models. 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 taxpayer should never be told that "the computer" or "the system" produced the appraisal. Equations converted to tabular form can be used to explain the basis for valuation.

In all cases, the assessor's staff should be able to produce sales, appraisals, or rental information 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.

9.3 APPEALS SYSTEM

An appeals system may have numerous levels. At each of these levels, the appeal body should publish and make available deadlines, operating procedures, rules, and regulations, so that all parties understand what is required of them and how the appeal will be conducted.

For all assessed property, the appeals process should be conducted at the following levels:

- Informal review by the assessor, including an on-site inspection of the property if practicable
- Formal review by appeals board (local, state, provincial, or national)
- Formal judicial review

The process should include the following features:

- Reasonable fees and filing costs based on some measure of appeal complexity
- Notification of hearing procedures and results at each decision level, including reason for decision
- Hearings
- Public relations

Appeals boards must be knowledgeable and competent to hear appraisal-related appeals. An independent or supervisory agency should provide training for hearing officers. Board members should not have conflicts of interest that may bias their decisions. After the informal review, all formal proceedings should be open to the public and transcripts made available. Notification of the hearing time and place should include the time to be allotted to the case and a brief explanation of procedures and rules of evidence.

10. TRANSPARENCY AND PUBLIC RELATIONS

10.1 IMPORTANCE OF TRANSPARENCY AND PUBLIC RELATIONS

A public relations program provides an important opportunity for positive interaction among tax administrators, the public, and media. See the IAAO Standard on Communications and Outreach (2023). This interaction can be used to promote programs, communicate policies, and inform the public of assessment issues. A proactive communications program is essential to create public awareness of the assessment process. The significance of the property tax as a funding source for governmental services should also be emphasized. An effective communications program encourages media coverage that is accurate and thorough and results in a better-informed public and promotes taxpayer confidence. Brochures, newspaper articles, websites, public meetings, and public announcements can be used in this process.

Public access to assessment records is crucial to good communications and an effective mass appraisal program. Measures should be taken to ensure a climate of openness and transparency. Assessment office personnel should understand policies and laws pertaining to open records, public disclosure, and confidentiality, including an awareness of compliance timelines. The assessing officer should establish guidelines for the disclosure of real estate records or taxpayer information and should be sensitive to privacy concerns. A standard operating procedure for information requests should be developed. Legislation should support openness and transparency.

10.2 DOCUMENTATION

Valuation procedures and models should be documented. The input used in the valuation model should also be documented as well as the results of any quality checks made on the data. 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. Valuation models and other algorithms applied should be documented and reproducible, so that rerunning the model will produce the same value if data remains unchanged. 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 useful 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, adjustments, and statistical quality measures. Examples of how values were computed for sample properties can be particularly helpful. The manuals serve as a resource for current staff and for 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.

11. MANAGEMENT AND PERSONNEL

11.1 FUNDING PROPERTY TAX ADMINISTRATION

The resources provided for property tax administration reflect political support for legal, equitable taxation. To achieve political (popular) acceptance, revenue targets, and other goals, the tax administration should have sufficient human and technological resources. Some tax system failures can be attributed to inadequate funding. A related problem occurs when system features are not cost-effective (e.g., property tax relief measures that are trivial and complicated to administer). Some countries approach this problem by exempting properties of small value or size to achieve administrative efficiency.

An overall measure of efficiency is the ratio of administrative costs to property tax revenues. The objective is to minimize this ratio without sacrificing fairness. Factors that affect absolute costs and costs per unit of revenue are differences in the coverage of property tax bases, whether taxes are based on area or value, the frequency of revaluations, the extent of automation, and whether there are other uses of valuation and cadastral data. The cost per unit of revenue also depends, in part, on effective tax rates. In general, the higher the effective tax rate, the lower the administrative cost rate. Another difficulty in analyzing funding (and staffing) is that many governmental budgeting and accounting systems do not permit segregating property tax-related costs from all costs. It also is important to recognize that start-up costs usually are considerably greater than annual operational costs after a system has been working for several years.

For reasons such as these, few statistics on direct expenditures or relative costs are available in the literature. However, administrative costs in the range of 2-5 % of revenues often are achieved in developed Western countries. Ratios in excess of 10% may be symptomatic of problems. Some property tax systems are dysfunctional in that administrative costs are higher than the revenue received — or would be if the tax were administered as required by the law. The problem of administrative costs in excess of revenues can occur in otherwise functional systems when very small properties (especially small items of personal property) must be assessed. It also is worth noting that exemption and relief measures increase administrative costs while tending to decrease revenue. Such instances can often be addressed by exempting values below minimum thresholds.

11.2 MANAGEMENT AND ORGANIZATION

Mass appraisal and assessment systems require effective, sound management. Requirements of the property tax system and the mandated duties of the office must be considered when a management plan is being developed. Formalized management structures, processes and oversight procedures are essential. Taxpayers and stakeholders also benefit from well-managed assessment offices because organization lends itself to increased transparency.

Planning is essential to sound management. A formal management plan communicates the vision and ensures compliance with local and regional rules and legislation. A management plan also provides a solid foundation for budget requests. It provides a basis for organizing work, measuring progress, and evaluating performance.

At the agency level, well-developed organizational designs consider the nature of activities, the volume of work, the skills required, and realistic production rates. Effective organization of tasks increases efficiency.

A property tax agency should have a written organizational plan that documents, with charts and statements, the responsibilities of each job and organizational unit. These documents formalize the delegation of work and depict lines of communication. Managers should always be alert to organizational problems, such as bottlenecks, tasks that are not performed, and duplication of effort. Agency leadership should consider continuity of operations by cross training personnel to reduce single points of failure if a staff member resigns or must go on leave.

Quality assurance is another important concern of management. Quality assurance evaluates the effectiveness of practices, procedures, and systems used to achieve legal and fair taxes. Public acceptance of property taxes and the perception of fairness are reinforced when data are accurate, valuations appear accurate and uniform, and all taxpayers are treated without prejudice or favoritism. A major quality assurance tool is the ratio study.

11.3 PERSONNEL, TRAINING, AND QUALIFICATIONS

In general, property tax administrators are full-time civil servants. However, elected property tax officials and part-time boards are also common. Although board members can be appointed by the property tax administration or appointed by local governments, they sometimes are elected.

The qualifications of valuers (appraisers) can be an important issue, and international experience varies with respect to the importance of academic preparation, in-service training, and professional credentials. The professionalization of valuers and property tax administrators largely is a 20th century development. Internationally, appraisal is a specialty of different professions, including architecture, civil engineering, and surveying. However, knowledge of economics and statistics is now recognized as important. Consequently, academic credentials are important in many countries. Qualifications needed for mass appraisal are different from those for traditional forms of single-property appraisal.

Adequate compensation of employees is necessary to maintain professional staff. Low levels of pay can distort the picture of administrative costs because low levels of pay and competent administration cannot be sustained in the long run.

The assessment profession has the ultimate responsibility for providing in-service training and continuing education. Assessing officers should be included in planning their professional education program. Funding to develop and conduct training programs may be obtained from various sources, and the funder often retains administrative authority.

A good model for administering professional assessment education programs includes systems for

- Determining training needs
- Providing adequate funding
- Promoting the programs and encouraging participation
- Scheduling, obtaining, and evaluating courses and instructors.

The government agencies responsible for property assessment should establish position descriptions for all positions. Each description should include required educational background, experience, duties, and skills required for the position. Each agency should include cyber security training for their staff to help secure the assessment systems from third party attack.

11.4 HARDWARE AND SOFTWARE SUPPORT FOR MASS APPRAISAL

CAMA systems require considerable data processing support and integration with other systems.

11.4.1 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. Cloud or vendor-based hosting options are also becoming desirable and provide increased uptimes, and configurable memory, CPU, and disk space options. 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.

11.4.2 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. It is important that these programs and applications 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. Systems configurations should be evaluated by a cyber-security professional and security testing (penetration test) performed before going-live and on a regular interval to verify system integrity.

GLOSSARY

GLOSSARY

Abatement. (1) An official reduction or elimination of one's assessed valuation after completion of the original assessment. (2) An official reduction or elimination of one's tax liability after completion of the tax roll.

Aerial Photograph. A photograph of a part of the earth's surface taken by an aircraft-supported camera.

Agricultural Property. Improved or unimproved land and agricultural support buildings devoted to or available for the production of crops or other agricultural products and livestock.

Appeal. A process in which a property owner contests an assessment either informally or formally.

Ad Valorem. According to value.

Ad Valorem Tax. A tax levied in proportion to the value of the thing(s) being taxed. Exclusive of exemptions, use-value assessment provisions, and the like, the property tax is an ad valorem tax.

Annual Rental Value. The expected annual rent (or income). This value can be calculated by using gross or net rent.

Appeal. A process in which a taxpayer contests a value or assessment either informally or formally. See Review.

Appraiser (see Valuer). One who estimates the value of property; more commonly, one of a group of professionally skilled persons holding themselves out as experts in valuation.

Appraisal. An estimate of value in terms of money.

Arm's. Length Transaction. (1) A sale between a willing buyer and a willing seller who are reasonably knowledgeable of market conditions, are unrelated, and are not acting under duress, abnormal pressure, or undue influences. (2) A sale between two unrelated parties, both seeking to maximize their positions from the transaction.

Assessment. The official act of determining the tax base; the value placed on property for property tax purposes. See rating.

Assessment Cycle. A legally sanctioned reappraisal period generally ranging from 1 to 10 years.

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 Equity. The degree to which assessments bear a consistent relationship to market value.

Assessment Level. The common, or overall, ratio of assessed values to

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 that the total of the assessment roll bears to the total market value of all taxable property in a jurisdiction.

Assessment Ratio Study. An investigation intended to determine the assessment ratio and assessment equity.

Automated Valuation Model (see Computer-assisted Mass Appraisal). A computer program for property valuation that analyzes data using an automated process.

Buoyancy. The ability of tax yields to rise (and fall) with the economy and with revenue needs. Buoyancy is a characteristic of value-based property tax systems.

Cadastral Map. A large-scale map displaying property ownership boundaries and showing the dimensions of each parcel with related information such as parcel identifier, survey lines, and easements.

Capital Value (see Market Value). The price that would be expected in an open-market, arm's-length sale.

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 COD is the average percentage deviation from the median ratio.

Coefficient of Price-Related Bias (PRB). A measure of vertical equity between lower and higher value properties. The PRB indicates the percentage by which assessment ratios change whenever values double or are halved (e.g., a PRB of $-.035$ means that ratios fall by 3.5% when values double and increase by 3.5% when values are halved.).

Computer-Assisted Mass Appraisal (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 procedure, to assist the appraiser in estimating value.

Comparable Sales, Comparables. (1) Recently sold properties that are 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.

Cost. The money spent on obtaining an object or attaining an objective; generally used in appraisal to mean the expense, direct and indirect, of constructing an improvement.

Cost Approach. The cost approach estimates the replacement cost new of an improvement less depreciation plus land value.

Cost Schedules. Charts, tables, factors, curves, equations, and the like intended to help estimate the cost of replacing a structure from knowledge of some other factors, such as its quality class and number of square meters.

Depreciation. Loss in value of an object, relative to its replacement cost new, reproduction cost new, or original cost, whatever the cause of the loss in value. Depreciation is divided into three types: physical deterioration (wear and tear), functional obsolescence (suboptimal design in light of current technologies or tastes), and economic obsolescence (poor location or radically diminished demand for the product).

Depreciation Schedules. Tables used in mass appraisal that show the typical loss in value at various ages or effective ages for different types of properties.

Effective Tax Rate. (1) The tax rate expressed as a percentage of market value; it will be different from the nominal tax rate when the assessment ratio is not equal to 1. (2) The relationship between the tax amount and market value of a property. The rate may be calculated either by dividing tax by value or by multiplying a property's assessment level by its nominal tax rate.

Equity. (1) In assessment, 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 tax fairness. (3) In ownership, the net value of property after liens and other charges have been subtracted.

Geographic Information System (GIS). (1) A database management system used to store, retrieve, manipulate, analyze, and display spatial information. (2) One type of computerized mapping system capable of integrating spatial data (land information) and attribute data among different layers on a base map.

Holdout Sample. A sample not used in model development but rather to test the model. The sample is usually drawn randomly and provides an objective test of the model when applied to properties not used to develop the model.

Improvements. Buildings, other structures, and attachments or annexations to land that are intended to remain so attached or annexed, such as sidewalks or sewers.

Income Approach. One of the three approaches to value, based on the concept that current value is the present worth of future benefit to be derived through income production by an asset over the remainder of its economic life. The income approach uses capitalization to convert the anticipated benefit of the ownership of property into an estimate of present value.

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 name.

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.

Map. A conventional representation, usually on a plane surface and at an established scale, of the physical features (natural, artificial or both) of a part or the whole of the earth's surface. Features are identified by means of signs and symbols, and geographical orientation is indicated.

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

Market Adjustment Factors. Factors reflect supply and demand preferences used to adjust values obtained from the cost approach to the market. These adjustments may be by type of property and area and are based on sales ratio studies or other market analyses.

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 subject to similar economic forces and supply and demand factors. A separate valuation model is often developed for each market area. Smaller or mid-sized jurisdictions may constitute a single market area.

Market Value (see Capital Value). 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 knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specific 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 or in terms of financial arrangements comparable thereto;

The price represents the normal consideration for the property sold unaffected by special financing or sales concessions granted by anyone associated with the sale.

Mass Appraisal. The process of valuing a group of properties as of a given date, using standard methods, employing common data, and allowing for statistical testing.

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.

Model Calibration. The development of adjustments, or coefficients based on market analysis, that identifies specific factors with an actual effect on market value.

Model Specification. The formal development of a model in a statement or equation, based on data analysis and appraisal theory.

Multiple Regression, Multiple Regression Analysis (MRA). A particular statistical technique, similar to correlation, used to analyze data in order to predict the value of one variable (the dependent variable), such as market value, from the known values of other variables (called independent variables), such as lot size, number of rooms, and so on.

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 purpose, such as to ensure for later multiple regression modeling that the properties are relatively homogeneous and share important locational characteristics.

Non-value-Based Systems. Property tax systems based on a fixed amount per property, or based on area or a fixed formula.

Open-Market, Arm's-Length Transaction. (1) A sale between a willing buyer and a willing seller who are reasonably knowledgeable of market conditions, are unrelated, and are not acting under duress, abnormal pressure, or undue influences (2) A sale between two unrelated parties, both seeking to maximize their positions from the transaction.

Parcel. A contiguous 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 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 record-keeping and handling. Also called parcel identification number.

Personal Property (Chattel). Consists of every kind of property that is not real property; movable without damage to itself or the real estate; subdivided into tangible and intangible.

Price-Related Differential (PRD). 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.

Price-Related Bias (PRB). See Coefficient of Price- Related Bias (PRB).

Price, Sale. (1) The actual amount of money exchanged for a unit of goods or services, regardless of whether established in a free and open market. An indicator of market value. (2) Loosely used synonymously with "offering" or "asked" price. *Note:* The sale price is the "selling price" to the vendor and the "cost price" to the vendee.

Property Record. An assessment document used to record data for property identification description, and for value estimation.

Property Tax Levy. (1) The total amount of money to be raised from the property tax as set forth in the budget of a taxing jurisdiction. (2) Loosely, by extension, the millage rate or the property tax bill sent to an individual property owner.

Property Tax Levy Limits. A form of tax and expenditure limitation, applicable to all local governments in the state, in which an upper limit is placed on either the proceeds of the property tax or the rate of growth in the proceeds of the property tax.

Property Tax Policy. A purposeful course of action by governmental bodies that affects or determines the way property taxes are created, levied, collected, or spent.

Rates. The term used in many countries for recurrent property taxes. Rates are often based on annual values.

Rating. A synonym for assessing or assessment (*see* Assessment).

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). *See also* Level of Appraisal.

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.

Reappraisal. The mass appraisal of all property within an assessment jurisdiction accomplished within or at the beginning of a reappraisal cycle. Also called revaluation or reassessment.

Reappraisal Cycle. (1) The period of time necessary for a jurisdiction to have a complete reappraisal. For example, a cycle of five years occurs when one-fifth of a jurisdiction is reappraised each year and also when a jurisdiction is reappraised all at once every five years. (2) The maximum interval between reappraisals as stated in laws.

Reassessment. (1) The relisting and revaluation of all property, or all property of a given class, within an assessment district by order of an authorized officer or body after a finding by such an official or body that the original assessment is too faulty for correction through the usual procedures of review and equalization. (2) The revaluation of all real property by the regularly constituted assessing authorities, as distinguished from assessment on the basis of valuations most or all of which were established in some prior year. See *also* Re-valuation.

Reliability. The degree to which measures are free from random error and therefore yield consistent results; the extent to which a procedure yields consistent results on repeated trials.

Rental Value. See Annual Rental Value.

Revaluation. A reappraisal of property; especially a complete reappraisal of real property after assessment for one or more years on valuations most (or all) of which were established in some prior year. Compare Reassessment and Reappraisal.

Review. (1) Examination by a board of appeals or a court of valuations (see Appeal), (2) The act or process of critically studying a report, such as an appraisal, prepared by another.

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

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

Software. (1) Computer programs. (2) Those parts of a computer system that are not machinery or circuits; procedures and possibly documentation are included along with programs.

Statute. A written law that comes from a legislative body.

Tax. A compulsory charge levied by a government unit against the income or property of a person, natural or corporate, for the common benefit of all citizens. The term does not include specific charges made against persons or property for current or permanent benefit and privileges accruing only to those paying such charges, such as licenses, permits, and specific assessments.

Taxable Value. Taxable value is the appraised value minus all applicable partial exemptions. Property taxes are levied on taxable value.

Uniformity. The equality of the burden of taxation in the method of assessment.

Uniform Standards of Professional Appraisal Practice (USPAP). Annual publication of the Appraisal Standards Board of The Appraisal Foundation: “These Standards deal with the procedures to be followed in performing an appraisal, appraisal review, or appraisal consulting service and the manner in which an appraisal, appraisal review, or appraisal consulting service is communicated. Standard 6 establishes requirements for the development and reporting of mass appraisals of a universe of properties for ad valorem tax purposes or any other intended use” (The Appraisal Foundation, Appraisal Standards Board, 2002, Preamble, p. 6).

Use Value. (1) The value of property in a specific use. (2) Property entirely used for a specific purpose or use that may entitle the property to be assessed at a different level than others in the jurisdiction. Examples of properties that may be assessed at use value under the laws include agricultural land, timberland, and historical sites.

Valuation. (1) The process of estimating the value—market, investment, insured, or other properly defined value—of a specific parcel or parcels of real estate or of an item or items of personal property as of a given date. (2) The process or business of appraising, of making estimates of the value of something. The value usually required to be estimated is market value.

Valuation Model. A representation in words or in an equation that explains the relationship between value or estimated sale price and variables representing factors of supply and demand.

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 benefit arising from the ownership of real or personal property. (3) The estimate sought in a valuation. *See also* Market Value.

Value Based Systems. Property tax systems based on a measure of value to include market or capital value, rental value, business value, and use or productivity value.

Valuer (see Appraiser). One who estimates the value of property; more commonly, one of a group of professionally skilled persons holding themselves out as experts in valuation.

REFERENCES & SUGGESTED READING

REFERENCES

- Appraisal Standards Board. (2023). *Uniform standards of professional appraisal practice*, 2024 ed. Washington, DC: The Appraisal Foundation.
- Bahl, R. (2009). *Property tax reform in developing and transition countries*. United States Agency for International Development. https://pdf.usaid.gov/pdf_docs/PNADW480.pdf
- Federal Land Cadastre Service of Russia. 2001. *Land (real estate) mass valuation systems for taxation purposes in Europe*. Federal Land Cadastre Service of Russia, Moscow, on behalf of United Nations Economic Commission for Europe Committee on Human Settlements Working Party on Land Administration, Geneva. https://unece.org/sites/default/files/2022-01/mass_valuation_systems.pdf
- Gloude-mans, R.J. (1999). *Mass appraisal of real property*. Kansas City: International Association of Assessing Officers.
- Gloude-mans, R.J., and R. Almy. (2011). *Fundamentals of mass appraisal*. Kansas City: International Association of Assessing Officers.
- International Association of Assessing Officers (IAAO). 2003. *Assessment administration*. Kansas City: IAAO.
- IAAO. (2016b). *Standard on manual cadastral maps and parcel identifiers*. Kansas City: IAAO.
- IAAO. (2020b). *Standard on verification and adjustment of sales*. Kansas City: IAAO.
- IAAO. (2023). *Standard on communications and outreach*. Kansas City: IAAO.
- IAAO. (2015). *Standard on digital cadastral maps and parcel identifiers*. Kansas City: IAAO.
- IAAO. (2016a). *Standard on assessment appeal*. Kansas City: IAAO
- IAAO. (2017). *Standard on mass appraisal of real property*. Kansas City: IAAO.
- IAAO. (2013). *Standard on ratio studies*. Kansas City: IAAO.
- International Association of Assessing Officers and Urban and Regional Information Systems Association. (1999). *GIS guidelines for assessors*, 2nd ed. Park Ridge, Illinois: The Urban and Regional Information Systems Association. https://www.urisa.org/clientuploads/directory/Documents/Books%20and%20Quick%20Study/gis_guidelines_assessors.PDF
- National Research Council. 1983. *Procedures and standards for a multipurpose cadastre*. Washington, DC: National Research Council.
- Norregaard, J. (2015). Taxing immovable property: Revenue potential and implementation challenges. In Clements, B. J., de Mooij, R. A., Gupta, S., and Keen, M. (Eds.), *Inequality and fiscal policy* (np). International Monetary Fund.

SUGGESTED READING

- Almy, R. 2001. A survey of property tax systems in Europe. A report prepared for the Ministry of Finance of Slovenia. <http://www.agjd.com/EuropeanPropertyTaxSystems.pdf>.
- Almy, R., & Cusack, M. (2018). Workable solutions for property tax reform. *Journal of Property Tax Assessment & Administration*, 15(2), 49-65
- Almy, R., A. Dornfest, and D. Kenyon. (2008). *Fundamentals of tax policy*. Kansas City, MO: IAAO.
- Awasthi, R., Le, T. M., and You, C. (2020). Determinants of property tax revenue: Lessons from empirical analysis (World Bank Policy Research Working Paper No. 9399). <https://openknowledge.worldbank.org/entities/publication/6fbe56de-eba3-55d4-94ad-5bb078a3f5a1>
- Bahl, R. 1998. Land taxes versus property taxes in developing and transition countries. In *Land value taxation: Can it and will it work today?* ed. D. Netzer. Cambridge, MA: Lincoln Institute of Land Policy.
- Bahl, R., and J. Martinez-Vazquez. 2006. The property tax in developing countries: Current practices and prospects. Working paper, Andrew Young School of Policy Studies, Georgia State University, Atlanta.
- Bahl, R., Martinez-Vazquez, J., and Youngman, J. (Eds.). (2010). *Challenging the conventional wisdom on the property tax*. Cambridge, MA: Lincoln Institute of Land Policy.
- Bahl, R., Martinez-Vazquez, J., and Youngman, J. (Eds.). (2008). *Making the property tax work: Experiences in developing and transitional countries*. Cambridge, MA: Lincoln Institute of Land Policy.
- Bird, R. M. and Slack, E. (Eds.) (2004). *International handbook of land and property taxation*. Cheltenham, U.K.: Edward Elgar.
- Bird, R., and E. Slack. 2002. Land and property taxation around the world: A review. *Journal of Property Tax Assessment and Administration* 7 (3): 31–80.
- Bird, R. M. and Slack, E. (2005). Land and property taxation in 25 countries: A comparative review. *CESifo DICE Report*, 3(3), 34-42.
- Borck, R., Oshiro, J., and Sato, Y. (2022). Property tax competition: A quantitative assessment (CESifo Working Paper No. 10002). <https://www.cesifo.org/en/publications/2022/working-paper/property-tax-competition-quantitative-assessment>
- Brown, P. K. and Hepworth, M. (2001). European property taxation: Changing times (Lincoln Institute of Land Policy Working Paper). <https://www.lincolnst.edu/publications/articles/european-property-taxation>
- Bunn, D. (2022). *International tax competitiveness index 2022*. Tax Foundation. <https://taxfoundation.org/research/all/global/2022-international-tax-competitiveness-index/>
- Chapman, J. I. (2015). Annotated bibliography on land value taxation and value capture (With a little bit on the Henry George Theorem) (Lincoln Institute of Land Policy Working Paper). <https://www.jstor.org/stable/resrep18549>
- De Cesare, C. (2010). Overview of the property tax in Latin America (Lincoln Institute of Land Policy Working Paper). https://www.lincolnst.edu/sites/default/files/pubfiles/1856_1163_DeCesare_2010_English_OCT2011_Replacement.pdf
- De Cesare, C. (2012). *Improving the performance of the property tax in Latin America*. Lincoln Institute of Land Policy. https://www.lincolnst.edu/sites/default/files/pubfiles/improving-performance-property-tax-latin-america-full_0.pdf
- De Cesare, C. (2016). *Sistemas del impuesto predial en América Latina y el Caribe*. Cambridge, MA: Lincoln Institute of Land Policy.
- Franzsen, R. and McCluskey, W. J. (2005). *An exploratory overview of property taxation in the Commonwealth of Nations* (Lincoln Institute of Land Policy Working Paper). https://www.lincolnst.edu/sites/default/files/pubfiles/1069_Franzen_complete_web.pdf

- Franzsen, R.C.D., and J. Youngman. 2009. Mapping property taxes in Africa. *Land Lines* (July 2009): 8–13. <https://www.lincolninst.edu/publications/articles/mapping-property-taxes-africa>.
- Franzsen, R. and McCluskey, W. (2017). *Property tax in Africa*. Cambridge, MA: Lincoln Institute of Land Policy.
- IAAO. (2020a). *Standard on property tax policy*. Kansas City: IAAO.
- IAAO. (2021). *Standard on data quality*. Kansas City: IAAO.
- Jarass, L., and G. Obermair. 2000. Structures of the tax systems in Estonia, Poland, Hungary, the Czech Republic and Slovenia. https://taxation-customs.ec.europa.eu/system/files/2016-09/tax_sys_est_pol_hu_en.pdf (accessed 2 December 2011).
- Jibao, S. 2009. Property taxation in Anglophone West Africa: Regional overview. Lincoln Institute of Land Policy working paper. Cambridge, MA. http://www.lincolninst.edu/pubs/1592_Property-Taxation-in-Anglophone-West-Africa.
- Joumard, I. 2002. Tax systems in European Union countries. OECD Economic Studies No. 34, 2002/1: Paris: OECD. <http://www.oecd.org/eu/2968128.pdf>.
- Kelly, R., White, R., and Anand, A. (2020). *Property tax diagnostic manual*. Washington, D.C.: World Bank. <https://openknowledge.worldbank.org/entities/publication/61063f54-50a0-501e-95aa-ae55e60dc35f>
- Kitchen, H., McMillan, M., and Shah, A. (2019). *Local public finance and economics: An international perspective*. Cham, Switzerland: Springer Nature.
- Knebelmann, J. (2022). *Digitalisation of property taxation in developing countries: Recent advances and remaining challenges*. ODI. https://cdn.odi.org/media/documents/Digitalisation_of_property_taxation_in_developing_countries.pdf
- Leodolter, A., Princen, S., and Rutkowski, A. (2022). *Immovable property taxation for sustainable & inclusive growth* (European Commission Discussion Paper No. 156). https://economy-finance.ec.europa.eu/system/files/2022-02/dp156_en.pdf
- McCluskey, W., ed. 1991. *Comparative property tax systems*. Aldershot: Avebury.
- McCluskey, W. J., 2018. *Property tax: An international comparative review*, Routledge Revivals ed. London, U.K.: Routledge.
- McCluskey, W. J., G. Cornia, and L. Walters (Eds.). (2013). *A primer on property tax: administration and policy*. Chichester, England: Wiley-Blackwell.
- McCluskey, W. J., & Franzsen, R. C. (2018). Issues around the value-based property tax in Africa. *Journal of Property Tax Assessment & Administration*, 15(2), 19-32.
- McCluskey, W. J., Bahl, R., and Franzsen, R. C. (2022). *Property tax in Asia*. Cambridge, MA: Lincoln Institute of Land Policy.
- NALAS Task Force on Urban Planning. (2015). *Capacity building and improving environment for municipal practice in land management and taxation*. Network of Associations of Local Authorities of South-East Europe. <http://www.nalas.eu/land-management-and-taxation-practices/>
- Nhabinde, V. C. 2009. An overview of property taxation in Lusophone Africa. Working Paper. Lincoln Institute of Land Policy Working Paper. Cambridge, MA: Lincoln Institute of Land Policy. <https://www.lincolninst.edu/publications/working-papers/overview-property-taxation-lusophone-africa>
- Organisation for Economic Cooperation and Development. (2021). *Making property tax reform happen in China: A review of property tax design and reform experiences in OECD countries*. OECD. <https://www.oecd.org/tax/making-property-tax-reform-happen-in-china-bd0fbae3-en.htm>
- Organisation for Economic Cooperation and Development. (2022). *Housing taxation in OECD countries*. OECD. <https://www.oecd.org/publications/housing-taxation-in-oecd-countries-03dfe007-en.htm>

- Organisation for Economic Cooperation and Development. (2022). *Revenue statistics 2022*. OECD. https://www.oecd-ilibrary.org/taxation/revenue-statistics-2022_8a691b03-en
- Organisation for Economic Cooperation and Development. (2023a). *Revenue statistics in Africa*. OECD. https://www.oecd-ilibrary.org/taxation/revenue-statistics-in-africa_2617653x
- Organisation for Economic Cooperation and Development. (2023b). *Revenue statistics in Asia and the Pacific*. OECD. https://www.oecd-ilibrary.org/taxation/revenue-statistics-in-asia-and-the-pacific_5902c320-en
- Organisation for Economic Cooperation and Development. (2023c). *Revenue statistics in Latin America and the Caribbean*. OECD. https://www.oecd-ilibrary.org/taxation/revenue-statistics-in-latin-america-and-the-caribbean_8b555412-en
- Organisation for Economic Cooperation and Development. (2023d). *Tax administration 2023*. OECD. https://www.oecd-ilibrary.org/taxation/tax-administration-2023_900b6382-en
- Organisation for Economic Cooperation and Development. (2023e). *Tax Policy Reforms 2023: OECD and Selected Partner Economies*. OECD. <https://www.oecd.org/tax/tax-policy-reforms-26173433.htm>
- Pippin, S.E., M.S. Tosun, C. A. Carslaw, and R.M. Mason. 2010. Property tax and other wealth taxes internationally: Evidence from OECD countries. In *Advances in Taxation*, Vol. 19, ed. T. Stock, 145–169. Bingley, U.K.: Emerald Group Publishing Ltd.
- Radvan, M., Franzsen, R., McCluskey, W. J., and Plimmer, F. (2021). *Real property taxes and property markets in CEE countries and Central Asia*. Maribor, Slovenia: Lex Localis.
- Sanderson, P. (2019, Sep. 9). *Trends in property tax systems around the world* [Conference session]. 85th Annual IAAO Conference & Exposition, Niagara Falls, Ontario, Canada.
- Sanderson, P. (2022, Aug. 29) *Best practice in property tax assessment: Lessons from around the world* [Conference session]. 88th Annual IAAO Conference & Exposition, Boston, Massachusetts, United States.
- Sietchiping, R., ed. 2011. *Innovative land and property taxation*. Nairobi, Kenya: United Nations Human Settlements Programme.
- Sepulveda, C., and J. Martinez-Vazquez. 2011. Explaining Property Tax Collections in Developing Countries: The Case of Latin America. Working Paper Series, Paper 11-09, Andrew Young School of Policy Studies, International Studies Program, Georgia State University, Atlanta. <https://scholarworks.gsu.edu/icepp/89/>
- Thai Appraisal Foundation. 2006. *The first symposium of the world’s best practices in mass appraisal for Asia*. Bangkok, Thailand: Thai Appraisal Foundation.
- Tomson, A. (2005). Mass valuation theory and practice in transitional countries: Estonian, Latvian, and Lithuanian cases. *Journal of Property Tax Assessment & Administration*, 2(1), 43-56.
- Transberg, V. (2004). Property and land taxation in the Baltic states. *Journal of Property Tax Assessment & Administration*, 1(2), 31-43.
- Youngman, J. M., and J. H. Malme. 1994. *An International Survey of Taxes on Land and Buildings, for the Lincoln Institute of Land Policy*, Organization for Economic Cooperation and Development, and IAAO.
- Yuan, B., K. Connolly, and M. Bell. 2009. *A compendium of countries with an area-based property tax*. Working Paper Series, Cambridge: Lincoln Institute of Land Policy. http://www.lincolninst.edu/pubs/1625_A-Compendium-of-Countries-with-an-Area-Based-Property-Tax.