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Thought Leadership in Property Tax Valuation Issues

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Willamette Management Associates
Thought Leadership

Insights

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Thought Leadership in Property Tax Valuation Issues
Editors for This Issue: Terry G. Whitehead and Aaron M. Rotkowski

Property Tax Valuation Insights

Property Tax Dispute Resolution Insights

Intangible Asset Valuation Insights

Willamette Management Associates Insights

2015 Recipient of the Apex Literary Award

Forethoughts

This *Insights* issue focuses on topics related to ad valorem property tax valuation. In particular, this issue focuses on topics that relate to the value of the taxable property owned by centrally assessed taxpayers. These property valuation issues are often the subject of disputes between taxing authorities and corporate taxpayers.

This *Insights* issue addresses the measurement of economic obsolescence in the cost approach. This is an important topic because valuation analysts on opposing sides of a dispute often disagree on the economic obsolescence measurement.

This *Insights* issue also presents several discussions related to the valuation of taxpayer intangible assets. The specific taxpayer intangible assets that are discussed include (1) wireless spectrum, (2) computer software, and (3) the trained and assembled workforce. The valuation of taxpayer intangible assets—and the extraction of these intangible assets from the concluded taxpayer total unit value—is often an important component of the property tax valuation and assessment process.

Finally, this *Insights* issue focuses on strategies to resolve ad valorem property tax disputes. These dispute resolution strategies are both procedural and practical. The procedural dispute resolution strategies discussed herein are focused on avoiding traps in the property tax appeal filing process. The practical dispute resolution strategies discussed are focused on the valuation theory known as the "Dark Store Theory."

Willamette Management Associates analysts routinely perform the following ad valorem property tax valuation services: (1) valuation of the total unit of taxpayer assets, (2) capitalization rate studies, (3) functional obsolescence and economic obsolescence analyses, and (4) valuation of taxpayer intangible personal property.

About the Editors

Terry G. Whitehead

Terry Whitehead is the director of our Portland, Oregon, office, and he leads our income tax planning and compliance services practice.

Terry has nearly 20 years of experience in the valuation of business entities and business interests. His experience encompasses a wide variety of business valuation and financial consulting services including (1) intangible asset valuations, (2) acquisition fair value purchase price allocations, (3) transaction opinions, (4) lost profits/economic damages analyses, (5) gift and estate tax valuations, and (6) transaction equity allocation analyses.

Terry holds a bachelor of science degree in business administration, with an emphasis in accounting, from Warner Pacific College.

Terry holds the accredited senior appraiser (ASA) designation from the American Society of Appraisers, accredited in business valuation.

Prior to his business valuation career, Terry was a certified public accountant for a public accounting firm in Portland. Terry has also served as the director of valuation services for a public accounting firm in San Antonio, Texas, where he led that firm's business valuation and litigation support services practice.

Aaron M. Rotkowski

Aaron Rotkowski is a vice president in our Portland, Oregon, office. Aaron has over 15 years of valuation-related experience and is the director of our property tax valuation practice. Aaron's practice is focused on assisting taxpayers, taxing authorities, and their advisers on issues related to unit valuation, the identification and valuation of taxpayer intangible assets, capitalization rate studies, and obsolescence studies.

Aaron has authored numerous journal articles on topics related to property tax valuation, intangible asset valuation, and business valuation. He has published in such journals as the *Journal of Property Tax Assessment & Administration*, *Journal of Multistate Taxation*, *The Tax Lawyer*, *The Value Examiner*, and *Insights*.

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Thought Leadership

Issues Related to the Measurement of Economic Obsolescence

Aaron M. Rotkowski

The cost approach is often used in the unit valuation of industrial or commercial taxpayer properties. In a cost approach unit valuation, one common area of dispute is the identification and quantification of economic obsolescence. This discussion (1) summarizes several generally accepted methods to measure economic obsolescence, (2) provides guidance related to several economic obsolescence measurement controversies, and (3) includes several illustrative examples of economic obsolescence analyses.

Introduction

When commercial or industrial property is valued for state and local property tax purposes, the valuation objective is typically to estimate the value of property subject to ad valorem property tax. In these valuations, the property owner—or the taxpayer corporation—pays property tax based on the assessed value of its taxable property.

The cost approach is a generally accepted unit valuation approach to estimate the value of the taxpayer property. In a unit valuation, the cost approach is applied so as to value all of the taxpayer property in the aggregate. This discussion focuses on one component of the cost approach—the measurement of economic obsolescence.

The amount of economic obsolescence related to the subject taxable property is often an issue of controversy for three primary reasons:

1. Economic obsolescence may result in a large downward adjustment to the cost of the taxable property.
2. If the source of economic obsolescence is poorly explained in the valuation report, this valuation adjustment is sometimes (inappropriately) viewed as a "plug" number that artificially reduces the value of the taxable property.
3. The estimation of economic obsolescence often (and appropriately) involves the "resourcefulness and creativity" of the experienced valuation analyst.[1]

This discussion addresses several areas of controversy and potential confusion surrounding the measurement of economic obsolescence.

This discussion focuses on property tax valuations related to commercial or industrial property, where the subject taxable property is part of an income-producing business enterprise. This discussion is relevant to valuations where a cost approach valuation method is used to estimate the value of all of the subject taxable property in the aggregate (i.e., where the cost approach method is performed as part of a unit valuation).

These types of property tax valuations are often associated with taxpayer corporations that operate in the communications, energy, and transportation industries. However, this discussion may also be relevant to commercial taxpayers that operate in the processing, extraction, entertainment, hospitality, and health care industries. In other words, this discussion may be relevant to the owner of any industrial or commercial property that is valued by reference to the cost approach.

Definition of Economic Obsolescence

Economic obsolescence is one component in the application of the cost approach. Therefore, it may be helpful to understand the cost approach prior to any discussion of economic obsolescence.

The cost approach is based on the principle of substitution. This principle indicates that an individual would not pay more to purchase a fungible asset than the cost to construct an asset with similar utility.

Analysts commonly consider one of the following cost approach valuation methods to value property:

1. Reproduction cost new less depreciation (RPCNLD) method
2. Replacement cost new less depreciation (RCNLD) method

Historical cost or trended historical cost are sometimes used as a proxy for either replacement cost new or the reproduction cost new in the unit valuation.

Whichever cost approach valuation method is performed, the analyst should consider the following elements in the analysis:

1. All components of cost (including developer's profit and entrepreneurial incentive)
2. All forms of depreciation (including physical deterioration, functional obsolescence, and economic obsolescence)

One generally accepted cost approach property valuation formula is presented below:

Reproduction cost new (RPCN)
– Curable functional obsolescence
= Replacement cost new (RCN)
– Physical depreciation
= RCN less physical depreciation
– Incurable functional obsolescence
– External obsolescence
= Value indication

In the above property valuation formula, and in generally accepted property valuation practice, economic obsolescence is considered to be one component of external obsolescence.

The textbook *The Appraisal of Real Estate* defines external obsolescence as follows:

> External obsolescence may be caused by economic or locational factors. It may be temporary or permanent, but it is not usually curable on the part of the owner, landlord, or tenants.[2]

Table 1 presents alternative definitions of economic obsolescence from various authoritative sources. There are three characteristics of economic obsolescence that are consistent among the alternative definitions presented above and in Table 1.

First, economic obsolescence is not caused by the actions of the property owner. That is, the property owner (e.g., the corporate taxpayer) cannot cause or correct economic obsolescence—it arises from factors beyond the control of the property owner.

Second, economic obsolescence results in a deduction from the cost measurement in order to conclude value—it cannot result in an increase in value.

Third, economic obsolescence is not necessarily permanent. This is because the factors that cause economic obsolescence tend to change over time. These economic obsolescence causation factors are presented later in this discussion.

The crux of economic obsolescence, however, is not easily identified by reviewing the definitions presented in this discussion. What is implicit from the economic obsolescence definitions is that economic obsolescence exists when the commercial or industrial property owner cannot earn a fair return on the subject property, after all other value decrements have been accounted for.

A fair rate of return is one that is commensurate with the amount of risk. This rate of return varies depending on the nature of the subject assets. The starting point in a rate of return analysis is often the taxpayer company's cost of debt, cost of equity, or weighted average cost of capital. The fair rate of return may be adjusted up or down from one of these rates, depending on the nature of the subject assets.

The terms fair rate of return and required rate of return are used synonymously in this discussion.

To illustrate the fair rate of return, let's consider a simple example. Let's assume the taxpayer owns a piece of manufacturing equipment that can only manufacture Internet-enabled eyeglasses (iGlasses).

This tangible personal property is in like-new condition, it was designed and built after substantial research and development efforts. And, it performs

Table 1
Definitions of Economic Obsolescence

Valuing Machinery and Equipment—*Economic obsolescence* (sometimes called "external obsolescence") is a form of depreciation where the loss in value of a property is caused by factors external to the property. These may include such things as the economics of the industry; availability of financing; loss of material and/or labor sources; passage of new legislation; changes in ordinances; increased cost of raw materials, labor, or utilities (without an offsetting increase in product price); reduced demand for the product; increased competition; inflation or high interest rates; or similar factors.[1]

Guide to Property Tax Valuation—External obsolescence relates to a decrease in the subject property's value due to influences that are external to, or outside of, the subject taxpayer property. The two common components of external obsolescence are: (1) locational obsolescence and (2) economic obsolescence.

Locational obsolescence occurs when the location of the subject taxpayer property results in (1) a decrease in property income or (2) an increase in operating costs. Economic obsolescence occurs when the taxpayer corporation property owner can no longer earn a fair rate of return on the ownership/operation of the subject property.[2]

IAAO Handbook—External obsolescence is a loss in value from forces outside the property and is almost always considered incurable. Like incurable functional obsolescence external obsolescence can be measured by either the sales comparison or the capitalization of income method.[3]

WSATA Handbook—a temporary or permanent impairment of the utility or salability of an improvement or property caused by factors external to the property. External obsolescence may result from adverse market conditions. Because of its fixed location, real estate is subject to external influences that usually cannot be controlled by the property owner, landlord, or tenant. This loss in value is sometimes referred to as external obsolescence.[4]

Notes:
1. *Valuing Machinery and Equipment: The Fundamental of Appraising Machinery and Technical Assets*, 3rd ed., (Washington, D.C.: American Society of Appraisers, 2011), 89.
2. Robert F. Reilly and Robert P. Schweihs, *Guide to Property Tax Valuation* (Chicago: Willamette Management Associates, 2008), 262.
3. *Property Assessment Valuation*, 3rd ed., (Kansas City, Missouri: International Association of Assessing Officers, 2010), 302.
4. *Appraisal Handbook, Unit Valuation of Centrally Assessed Properties* (Western States Association of Tax Administrators, Committee on Centrally Assessed Properties, August 2009), XVI-8 to XVI-9.

all of its intended functions flawlessly. It would cost $100 million to design and reproduce this machine.

Let's also assume that two years after the machine was put in use, iGlasses turned out to be a disastrous flop with consumers, and demand for this novel product was effectively zero on the valuation date. Since the owner cannot earn a return on the ownership and operation of the iGlasses manufacturing machine, the market value of the hypothetical iGlasses manufacturing equipment is not much more than scrap value.

The reason why this equipment is no longer as valuable as when it was put in use is related to the existence of economic obsolescence. There is nothing inherently wrong with the subject equipment—it performs the functions it was designed to perform. Rather, external factors have resulted in a substantial decrease in the equipment's value.

The attributes of economic obsolescence will be further illustrated by the following:

1. A discussion of the factors that typically indicate the existence of economic obsolescence
2. An overview of the generally accepted methods used to measure economic obsolescence
3. Illustrative examples that quantify economic obsolesce for hypothetical taxpayer property owners

Qualitative Economic Obsolescence Considerations

One criticism of certain economic obsolescence analyses is that the concluded economic obsolescence is not properly supported. The analysts who assert this criticism may even agree with the math that supports the economic obsolescence measurement.

However, these analysts fundamentally disagree with the premise that the economic obsolescence measurement proves that the taxpayer's tangible property is less valuable.

That is, these analysts may agree that the taxpayer's manufacturing plant is underutilized and

"[A] credible economic obsolescence analysis will typically articulate the cause of the economic obsolescence."

it is reporting record low profit. However, these analysts will disagree that this condition makes the plant tangible property assets less valuable.

Therefore, a credible economic obsolescence analysis will typically articulate the cause of the economic obsolescence. This section discusses potential causes of economic obsolescence.

As noted earlier, economic obsolescence is *external* to the taxpayer property—that is, the property owner can neither cause nor correct economic obsolescence.

Obsolescence that is internal to the property is often considered to be functional obsolescence. An example of this type of obsolescence is a five-year-old widget manufacturing machine that can produce 100 widgets per hour when a modern widget manufacturing machine can produce 200 widgets per hour.

In this example, the value decrement associated with the older machine is property-specific.

The factors that cause economic obsolescence are related to both:

1. the subject property and
2. the industry or economy the subject property competes in.

The valuation textbook *Guide to Property Tax Valuation* (*GPTV*) lists 10 illustrative factors that are external to the commercial or industrial property owner and that may result in a value decrement of the subject property. This information is reproduced in Table 2.

Representative factors from that list include the following:

1. Increasing competition in the taxpayer industry
2. Rapid technological change in the taxpayer industry
3. Decreasing demand for the taxpayer's goods or services

The Table 2 factors affect economic obsolescence because they result in the property owner being unable to earn its required rate of return on its assets. This economic obsolescence concept is further explained in the Measuring Economic Obsolescence section of this discussion and with the illustrative examples included in that section.

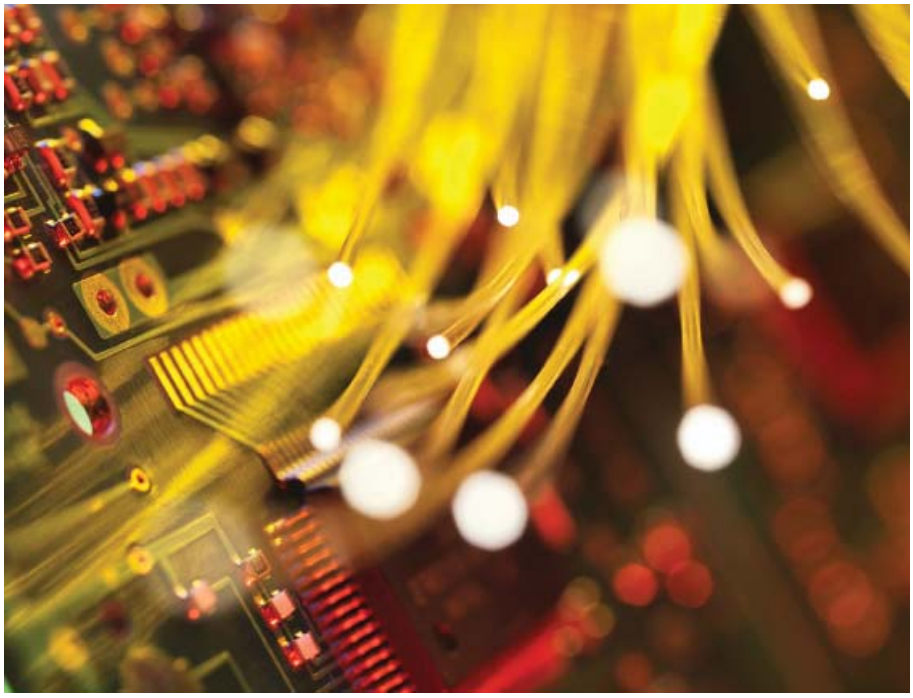
Analysts can uncover potential economic obsolescence (i.e., qualitative economic obsolescence factors) by analyzing the taxpayer company, the subject industry, and the general economy in which the taxpayer competes.

Table 2
Factors That May Indicate the Existence of Economic Obsolescence

- The subject taxpayer corporation industry is highly regulated.
- The taxpayer corporation and/or the subject taxpayer industry actual rate of return on assets is less than the taxpayer corporation and/or taxpayer industry cost of capital.
- The taxpayer corporation and/or subject taxpayer industry rates of return are decreasing.
- The taxpayer corporation property and/or the subject taxpayer industry has over capacity (i.e., the taxpayer corporation and/or subject taxpayer industry assets are underutilized).
- The subject taxpayer industry competition is increasing.
- The subject taxpayer industry demand is decreasing.
- The taxpayer corporation and/or the subject taxpayer industry supplier costs (e.g., raw materials, utilities, freight, etc.) are increasing.
- The taxpayer corporation and/or subject taxpayer industry labor costs are increasing.
- The subject taxpayer industry is experiencing technological change and improvement (e.g., cell phone usage reduces the demand for telephone land lines in the telecommunications industry).
- There is legislation or administrative authority requiring additional taxpayer corporation property and/or subject taxpayer industry capital expenditures (e.g., the required installation of pollution control devices).

Source: Robert F. Reilly and Robert P. Schweihs, *Guide to Property Tax Valuation* (Chicago: Willamette Management Associates, 2008), 266.

This type of analysis often involves both independent research and interviews with taxpayer company management.



Telecommunications Company Example

Let's consider a qualitative analysis related to the tangible property owned by an integrated telecommunications company (a "telecom").

The hypothetical telecom company ("ABC Co.") provides internet connectivity, landline telephone service, and wireless telephone services to retail consumers nationwide.

Let's assume that each of these three segments represents exactly one-third of the overall ABC Co. business.

The tangible property of ABC Co. is subject to property tax, and the analyst values the subject property on a unit valuation basis using a cost approach.

The analyst researched the telecom industry. The analyst's research focused on industry demand, profitability, regulation, and outlook.

The partial results of the industry analysis are presented below (all data are from S&P Capital IQ):

- The industry is "highly capital intensive, as providers need to invest heavily in expanding and enhancing their network."[3]
- Industry profit margins declined in 2014, and stabilized in 2015, due to (1) a consumer shift towards value pricing plans and (2) a more competitive landscape (lower prices), which are expected to persist in the foreseeable future.[4]
- Capital intensity increased over the last five years as spending levels outpaced growth. Higher spending related to broadband offerings is driving capital investment.[5]
- There is "limited upside in free cash flow for most wireless and wireline providers due to the challenging industry landscape that lies ahead, as growth prospects remain bleak."[6]
- "The carriers have long competed on price, but S&P Capital IQ sees a shift toward competing on speed. In the past few years, telcos made investments aimed at more than doubling the broadband connection speeds available to households, thus bringing the telcos' speeds more in line with those offered by competitors."[7]
- Prior to 2003, internet connections were made using copper cable. In 2003, the industry switched to fiber-optic connections (FTTP, or fiber to the premises). Now, fiber to the node, or FTTN, is being deployed rather than FTTP.

  Deploying FTTN is quicker and requires less invested capital than deploying FTTP.
- US wireless carriers will "continue to look for growth through . . . extensive capital investments to improve infrastructure and service."[8]
- "Entering new markets as a telecom provider can bring additional expenses, and the risk of an inadequate return."[9]

These data suggest that the telecom industry is becoming increasingly competitive. This competition is projected to lead to decreased profit margins. These data also suggest that technology is rapidly changing in the telecom industry, so telecom companies such as ABC Co. may be required to invest in new capital to remain competitive.

The above-described industry factors suggest that companies that compete in the telecom industry may own property that is subject to economic obsolescence.

An industry analysis is often one aspect of an economic obsolescence analysis. An economic obsolescence analysis should also consider if/how the general industry factors affect the subject taxpayer and its property.

For example, the telecom industry as a whole may be experiencing increasing competition, but the subject taxpayer may be adding customers and improving profit margins. Or, the subject taxpayer financial results may be inferior to the results of the industry as a whole.

In this example, the analyst reviewed the industry data relative to ABC Co. The analyst concluded that all of the industry data presented above is relevant to the specific markets in which ABC Co. competes. All of the factors listed above affect ABC Co.

Having researched data that suggest that the ABC Co. property may be subject to economic obsolescence, the next steps performed by the analyst are to finalize these preliminary conclusions and to quantify the economic obsolescence.

Generally accepted methods to quantify economic obsolescence are presented later in this discussion. The following is another example of a qualitative economic obsolescence analysis.

Pipeline Company Example

The qualitative analysis related to the ABC Co. focused primarily on an industry analysis. However, a company-specific analysis may also be relevant. This is because economic obsolescence can affect an entire industry—or it can only affect certain companies in an industry.

Let's consider a company-specific qualitative economic obsolescence analysis using a hypothetical pipeline company (PipeCo) that distributes natural gas in the West.

The following list summarizes important events in the PipeCo history:

- PipeCo was formed in May 2013.
- PipeCo obtained regulatory approval for a proposed 200 mile pipeline in December 2013.
- PipeCo entered into transmission contracts with four electric utilities throughout 2014.
- In the first half of 2015, PipeCo prepared budgets that reflected a 90 percent utilization based on its contractual relationships and market analysis.
- In the second half of 2015, an existing pipeline near (but not in) the PipeCo service area filed an application to expand its pipeline into the PipeCo service area.
- Construction on the PipeCo pipeline was completed in March 2016.
- In April 2016, one of the PipeCo customers was shut down due to low demand, and the PipeCo expected utilization decreased from 90 percent to 70 percent; PipeCo accordingly revised its projections downward.
- The overall market for the transmission of natural gas in the West was strong in 2015 and 2016, and expected to remain strong over the next five years.
- S&P Capital IQ warns that "overbuilding and concerns over deceleration of dividend growth have been weighing on valuations [of pipeline companies]."[10] Additionally, S&P Capital IQ indicates that "midstream has committed too much capital."[11]

PipeCo competes in a strong segment of the oil and gas industry, and it has a brand new pipeline. These factors are generally not indicative of economic obsolescence.

However, a closer look at the company-specific factors reveals the potential for economic obsolescence. This is because the PipeCo demand has decreased, and its expected return on investment has likewise been recently adjusted downward. Both of these factors—reduced demand and decreasing profit margins—are indicative of economic obsolescence.

As illustrated by the PipeCo example, a qualitative economic obsolescence analysis should consider the subject taxpayer's industry and how the taxpayer properties are deployed in that industry.

The next section of this discussion describes the generally accepted methods used to measure economic obsolescence.

Measuring Economic Obsolescence

There are three generally accepted methods to measure economic obsolescence. These methods include the following:

1. The inutility analysis method
2. The direct comparison of property with and without obsolescence method
3. The capitalization of income loss method

The Inutility Analysis Method

As stated in the textbook *Valuing Machinery and Equipment* (*VM&E*), the inutility analysis method "measures the loss in value by reducing the capital investment from rated capability to the actual operating level to 'balance' the plant."[12]

The inutility formula and an illustrative example of this method are presented in *VM&E*.

This method may not be the best method for complex industrial or commercial properties that have multiple lines of business, or that otherwise have different categories of tangible property that are unrelated to each other.

This is because the inutility that is measured only relates to the assets that are associated with the production of the good or service considered in the inutility formula. These assets may not represent all taxable assets owned by the taxpayer.

For example, let's return to the hypothetical telecom described above, ABC Co. Let's assume that the analyst measured the ABC Co. inutility related to the property used in the ABC Co. wireline segment at 50 percent.

This economic obsolescence conclusion only relates to one of the ABC Co. segments, or 33 percent of the overall business.

Therefore, the analyst has effectively concluded that the property used in 33 percent of the business suffers from 50 percent economic obsolescence. Or, the analyst has concluded about 17 percent obsolescence for the entire property.

In this example, the analyst cannot extrapolate 50 percent obsolescence for all ABC Co. property, since the analyst has not performed an economic obsolescence for all ABC Co. property.

The inutility analysis method is best suited to the following situations:

1. Properties where all assets contribute to the production of a similar good or service
2. Unit valuations where an inutility analysis can be performed for each taxpayer business or operating segment

The inutility analysis method would be an appropriate method to measure economic obsolescence related to PipeCo since all material PipeCo assets are related to the pipeline.

In situations where the inutility method is appropriate, analysts should consider that the inutility method may overstate or understate economic obsolescence.

This result may occur because the inutility method does not consider the property owner's return on assets.

For example, an inutility analysis related to PipeCo would only consider the fact that the pipeline utilization declined from 90 percent to 75 percent; it would not consider the company's income from the operation of its pipeline assets.

If PipeCo was able to increase prices to offset the reduced demand, it may be able to earn its required return on assets in spite of the lost customer. In this situation, the inutility method may overestimate the amount of economic obsolescence.

Conversely, if oversupply has caused prices to fall, then the decline in the PipeCo return on assets may be much greater than what would be indicated by analyzing inutility alone. This suggests that the inutility method may underestimate the amount of the economic obsolescence.

When using the inutility method to estimate economic obsolescence, the analyst may also consider the taxpayer's ability to earn a fair rate of return on its assets.

The Direct Comparison of Property With and Without Obsolescence Method

This method is described in the textbook *The Appraisal of Real Estate* using an illustrative example. It is also described in *GPTV*, where it is referred to as the paired sales comparison method.

In this method, economic obsolescence is estimated by comparing the value of the subject property (presumably, with economic obsolescence) to the value of property without economic obsolescence. The value of the comparable property in this method is usually based on transaction data.

This method is challenging to perform for complex commercial or industrial properties because there is often a lack of transaction data that is sufficiently comparable to the subject property for this method to produce credible results.

Comparable transaction data are hard to identify for analyses of complex commercial or industrial properties because these properties:

1. tend to be fairly unique (i.e., the "comparable" sales may not be sufficiently similar to the subject property) and
2. often sell with intangible assets as part of an operating business.

The Capitalization of Income Loss Method

The capitalization of income loss method is a commonly used methods to measure economic obsolescence in the case of complex commercial and industrial property.

According to the textbook *The Appraisal of Real Estate*, the capitalization of income loss method "is applied in two steps. First, the market is analyzed to quantify the income loss. Next, the income loss is capitalized to obtain the value loss affecting the property as a whole."[13]

To perform this procedure, the analyst may compare a measure of the taxpayer's current period profitably to either:

1. the profitably when there was no identified economic obsolescence,
2. the profitability of guideline companies, or
3. the profitability based on the projections that led to the investment decision.

The analyst may also consider alternate measures of profitability. Each of the comparative measures of profitability represent an estimated fair rate of return for the taxpayer.

A list of alternative measures of economic obsolescence from *VM&E* is reproduced in Table 3.

One common way to perform the capitalization of income loss method is to compare an actual return measure (e.g., return on assets) with a required return measure (e.g., weighted average cost of capital, or WACC). There are many possible variations of this procedure, and all are comparative in nature.

If a property had a required return of $10, an actual return of $8, and a direct capitalization rate of 10 percent, the income shortfall would be $2, and

Table 3
Alternative Measures of Economic Obsolescence

[M]easures of economic obsolescence can be developed based on the following:

- Analyses of industry returns—compare the returns on invested capital in the industry the subject property operates in to returns of general or all industries.
- Supply/demand relationships—determine if competition is increasing because of a surplus of supply or a decline in demand, causing margins to decline; develop a relationship showing a supply/demand imbalance or a trend showing increasing supply over demand.
- Gross margin analysis—compare the gross margins (product price less raw material cost) of the past to current gross margins, show how gross margins are declining.
- Product or raw material price changes—show how margins are declining because the product price is stable, while the raw material prices are increasing, resulting in a decline in earnings (see gross margin analysis above).
- Stock prices—compare the stock price of companies in the subject industry to a benchmark such as the company net book to a similar ratio in the general market to show a lower stock price/net book ratio for stocks in the subject industry.
- Sales transactions—calculate the magnitude of economic obsolescence for a similar property acquired in the market by comparing the cost indicator of value prior to deducting economic obsolescence to the actual sales price. (The difference is economic obsolescence.)
- The relationship between replacement cost new and the cash flows the hypothetical replacement facility is capable of generating—compare the replacement cost new to the income indicator of value for the same property; the difference is economic obsolescence.
- Other economic evidence indicating that the value of the subject property has been reduced by external factors—look for indications of reduced earnings, reduced utilization, changes in use, idle or shutdown plants in the industry or a restructuring within the industry, among others.

Source: *Valuing Machinery and Equipment: The Fundamental of Appraising Machinery and Technical Assets*, 3rd ed., (Washington, D.C.: American Society of Appraisers), 79–80.

the capitalization of income loss would equal $20 (i.e., $2 divided by 10 percent).

This $20 economic obsolescence conclusion could be subtracted from the concluded amount of the property's replacement cost new less physical depreciation and functional obsolescence.

This comparative procedure is similar to the direct comparison of property with and without obsolescence method described above because both are based on a *with*-economic-obsolescence measure to a *without*-economic-obsolescence measure.

Unlike the direct comparison of property with and without obsolescence method, the capitalization of income loss method is based on alternative measures of income rather than the value of the subject assets.

This method is commonly used for complex industrial and commercial property because it overcomes the challenges of the other two generally accepted methods listed above—it doesn't rely on transaction data and it generally accounts for disparate items of property working together as part of a single integrated business enterprise.

Several issues related to the income shortfall method are discussed next.

Independence from the Income Approach

One inappropriate procedure that some analysts use to estimate economic obsolescence is as follows:

1. Estimate the subject taxpayer's unit value using an income approach.
2. Estimate the RCN after subtracting physical depreciation and functional obsolescence of the taxpayer assets.
3. If the value from number one is less than the value from number two, subtract the first number from the second number in order to measure the economic obsolescence.

The procedure described above is essentially a plug to force the cost approach value to equal the income approach value. Therefore, this procedure does not result in a concluded value from the cost approach. Instead, the concluded value from the so-called cost approach is simply one more income approach conclusion.

This makes all of the cost approach procedures performed prior to this "plug" procedure irrelevant. The concluded cost approach value of the subject property would be the same regardless of whether subject property RCN was $1 trillion, $1 billion, or $1 million.

If the analyst exclusively relied on a yield capitalization method and an RCNLD method using the "plug" procedure described in this section, he or she cannot claim to have performed two independent valuation methods that are mutually supportive of the overall concluded value. This is one potential problem with using the "plug" procedure.

Another potential problem with the "plug" procedure arises if the subject taxing jurisdiction requires the analyst to perform a cost approach. Since this "plug" procedure results in an income approach valuation method, the analyst may not be able to rely on this method to meet the statutory requirement of considering a cost approach.

Alternative Measures of Income Loss

Some income shortfall analyses rely on a single measure of income shortfall. For example, the analyst will estimate economic obsolescence by comparing the taxpayer's return on assets to its WACC. If these values are 9 percent and 11 percent, respectively, the concluded economic obsolescence will be 18 percent (i.e., 9 percent divided by 11 percent, minus one).

This method to measure economic obsolescence is supported by authoritative texts and is generally accepted.

Depending on the specific facts and circumstances regarding the subject assets, it may be appropriate or persuasive to include multiple comparative measures of income loss in the economic obsolescence analysis. The use of mutually supportive measures is common in property valuation.

An example of this type of analysis is presented in Exhibit 1.

As presented in Exhibit 1, the analyst has calculated three separate return measures for the subject company. And, the analyst has compared the return in the most recent year with the average return over the preceding years.

Although any one of the measures would have supported the concluded 35 percent obsolescence adjustment, the use of multiple ratios, and the analysis of multiple years, provides additional support and increased credibility for the conclusion.

An alternative procedure to calculate economic obsolescence would be to compare the most recent year's returns to the historical maximum returns. This procedure is known as the best of the best method, or the blue chip method.

The income shortfall analysis may result in subject company rates of return that are greater than the benchmark (or required) rates of return. This situation may suggest that (1) the subject company owns

Exhibit 1
ABC Co.
Economic Obsolescence Measurement
Income Shortfall Method

ABC Co. Financial Fundamentals and Ratios	2015	2014	2013	2012	2011	2010	2010 to 2014 Average
EBITDA	19,000	30,000	48,000	49,000	37,000	36,000	40,000
Total Assets	185,000	205,000	235,000	260,000	280,000	300,000	256,000
Invested Capital [a]	175,000	200,000	230,000	250,000	275,000	300,000	251,000
Revenue	50,000	55,000	70,000	67,000	60,000	100,000	70,400
EBITDA Return on Total Assets	10.3%	14.6%	20.4%	18.8%	13.2%	12.0%	15.8%
EBITDA Return on Invested Capital	10.9%	15.0%	20.9%	19.6%	13.5%	12.0%	16.2%
EBITDA Return on Revenue	38.0%	54.5%	68.6%	73.1%	61.7%	36.0%	58.8%

Calculation of Economic Obsolescence:

	Based on Return on Total Assets	Based on Return on Invested Capital	Based on Return on Revenue
2015 ABC Co. Rate of Return	10.3%	10.9%	38.0%
2010 to 2014 Average ABC Co. Rate of Return	15.8%	16.2%	58.8%
Indicated Economic Obsolescence [b]	35.1%	32.9%	35.4%
Concluded Economic Obsolescence Percentage [c]	**35%**		

EBITDA = Earnings before interest, taxes, depreciation, and amortization
Notes:
[a] Invested capital is defined as working capital plus tangible assets plus other assets.
[b] Calculated as: (average return − 2015 return) ÷ by average return.
[c] Based on the average of the total obsolescence indications..

valuable intangible property (which may be exempt from property tax), (2) the subject company tangible property does not suffer from economic obsolescence, or (3) the income shortfall method is not a reliable method to estimate economic obsolescence.

Reconciling the Data

In Exhibit 1, the various ratios analyzed resulted in similar economic obsolescence conclusions. However, this does not always occur in practice.

The analyst may encounter one ratio that suggests no economic obsolescence, another ratio that suggests 80 percent economic obsolescence, and a third ratio that suggests 25 percent economic obsolescence.

Or, the subject company ratio that is analyzed in the economic obsolescence analysis (e.g., the taxpayer return on assets) may be 12 percent, and the comparative ratios may range from 4 percent to 25 percent, with a mean and median of 18 percent and 14 percent, respectively.

When the economic obsolescence market data leads to inconsistent results, the analyst has two options:

1. Reconcile the data to reach an economic obsolescence conclusion.
2. Conclude that the data is unreliable so there must be no economic obsolescence.

While it may be less controversial to conclude no economic obsolescence than to support a more nuanced economic obsolescence analysis, the latter is generally a more appropriate procedure. This is especially true if the qualitative analysis suggest that the subject property suffers from economic obsolescence.

Before discussing how to reconcile the data (either market data or company-specific data), it is helpful to consider why it is more acceptable to rely on data that are widely dispersed than to ignore economic obsolescence altogether.

Actual market data reflect unique company-specific or property-specific factors, and therefore the individual data points within a data set are justifiably different. This is particularly true for commercial and industrial taxpayers/property owners, which are the primary subject of this discussion.

Taxpayer companies that compete in the same industry own different assemblages of tangible and intangible assets and are affected by different economic factors.

For example, the demand drivers for railroad companies is different depending on the goods they transport; airline companies that compete on different terms (price versus amenities) earn different profit margins; and electric utilities that generate power using different raw materials have vastly different utilizations.

The point of these examples is to illustrate how different companies that compete in the same general industry could earn different profit margins, which in turn could suggest different amounts of economic obsolescence.

"While it may be less controversial to conclude no economic obsolescence than to support a more nuanced economic obsolescence analysis, the latter is generally a more appropriate procedure."

The market data used in a unit valuation rarely result in a tight range. Reconciling these data is part of the property valuation process.

If all companies in a particular industry earned exactly the same profit margins and traded at exactly the same pricing multiples, then there would be little need for analysts or unit valuations at all. The analyst's role is to reconcile the different data and reach valuation conclusions based on those data and the specific facts of the subject company.

If guideline company data are used, the following procedures can be performed by the analyst to reconcile disparate economic obsolescence market data:

- Adjust the historical financial statements of the guideline companies to remove the effects of one-time or nonrecurring income and expense items.
- Focus on a subset of the guideline companies that are most similar to the subject company.
- Analyze the particular industry subgroups the guideline companies compete in to understand differences in the guideline company ratios.
- Select different ratios for the comparative analysis.
- Place more emphasis on the comparative ratios that are more tightly clustered and less emphasis on the comparative ratios that are less tightly clustered.
- Exclude certain particularly high or low guideline company ratios.
- Consider the potential effects of recent major events in a company's history that may skew the indicated ratios, such as mergers, divestitures, product expansion, and so on.

When the comparable market data are widely dispersed, the analyst should use his or her professional judgment to reconcile the various market data that are used in an economic obsolescence analysis.

Excluding Intangible Personal Property

One common misconception about the cost approach is that it excludes value from all intangible personal property. If the capitalization of income loss method is improperly applied, the cost approach value could include value from intangible personal property.

This can be illustrated using an example. Let's consider a hypothetical 10-year-old coal-fired electric generating facility (the "Facility") with a power purchase agreement to sell substantially all of the Facility's generating capacity.

This power purchase agreement (the "PPA") provides substantial cash flow to the Facility owners based primarily on the capacity it has allocated to the PPA counterparty; the Facility earns income regardless of how much electricity it actually produces.

The Facility also is reimbursed for its coal costs via the PPA. With the PPA in place, the Facility is one of the most profitable electric generating plants in its region.

Finally, let's assume that over the decade since the PPA was originally executed, the price of electricity (the Facility output) and price of coal (the Facility input) have changed such that the facility cannot profitably produce electricity on and around the valuation date without the PPA in place. That is, without the PPA in place, the Facility would sit idle.

Since the PPA terms provide for Facility income that is greater than what is generally available in the market, the PPA is a valuable intangible asset.

In this example, the analyst decided to value the Facility property using the cost approach, which was performed on a unitary basis. The analyst analyzed economic obsolescence in the cost approach using the capitalization of income loss method.

In this example, the economic obsolescence analysis is based on Facility income, both historical and projected. However, the analyst will reach materially different economic obsolescence conclusions depending on how historical and projected income is estimated in the capitalization of income loss method analysis.

Let's consider the following two procedures the analyst can use to estimate the Facility income:

- First, the analyst can rely on actual historical and projected income, adjusted only for nonrecurring income and expenses. This income includes revenue from the PPA.
- Second, the analyst can estimate pro forma historical and projected Facility income as if the Facility operated without the PPA in place.

Using the first procedure to estimate Facility income results in no economic obsolescence. This is because the various measures of Facility profit are all near the high end of the comparable range and are all equal to or exceed the Facility required return on investment.

This procedure to estimate economic obsolescence results in a cost approach conclusion that includes value attributable to the PPA intangible asset. Therefore, this procedure results in a cost approach value that includes both tangible assets and intangible assets.

If the objective of the valuation is to conclude a value of the Facility tangible assets only, the analyst can either:

1. recalculate economic obsolescence so it does not include value from the PPA intangible asset or
2. subtract the value of the PPA intangible asset from the concluded cost approach value.

Using the second procedure to estimate the Facility income, the analyst estimated economic obsolescence of 70 percent (obsolescence was not 100 percent in this example because the analyst concluded that the market for coal-fired electric generating facilities would improve in the future).

This is because the various pro forma measures of Facility income are all substantially below the comparable range of profit margins and below the Facility required return on investment.

Since income is calculated excluding the benefit of the PPA intangible asset, this economic obsolescence analysis does not result in value being attributed to the PPA intangible asset.

If the facility RCN before economic obsolescence (but after all other forms of depreciation and functional obsolescence) was $1 billion, then these two different procedures to estimate economic obsolescence result in facility values that are over $700 million apart.

The conclusion of 70 percent economic obsolescence is more consistent with the qualitative analysis related to the Facility than a conclusion of no economic obsolescence.

As discussed above, the market for coal-fired electric generating plants has deteriorated to such an extent that coal-fired plants were idle rather than producing electricity around the valuation date (in this hypothetical example).

This situation is illustrative of the existence of economic obsolescence because high coal prices and low electricity prices are *external* to the Facility assets.

One simple sanity check on the concluded value is to consider the possible acquisition market for the subject tangible property, assuming no intangible assets were sold with the subject tangible property. In the electric generating facility example, it may be unrealistic to conclude that the Facility owner could sell the Facility (absent the PPA) for $1 billion when it cannot profitably generate electricity.

This example illustrates how a cost approach value conclusion can include value attributable to taxpayer intangible assets. This example also illustrates the importance of an economic obsolescence analysis that is consistent in terms of both the qualitative analysis and the quantitative analysis.

As shown in this example, if the subject taxpayer owns valuable intangible assets that contribute to its income, the analyst should consider if and how that income ought to be adjusted in a capitalization of income loss method. It may not be appropriate to estimate the amount of income loss based only on the subject taxpayer's reported financial statements.

Low Returns Due to Poor Management

Some analysts assert that the reason property is not earning its required rate of return is due to poor management decisions, rather than due to economic obsolescence that is inherent to the subject property.

The primary rationale for this argument is that since the taxpayer cannot earn its required rate of return on its assets, the assets should not have been acquired and put into place to begin with. Some analysts argue that the existence of overcapacity (for example) proves management made a bad business decision and overbuilt; that is, excess demand does not prove the existence of economic obsolescence.

This argument is most often made in regard to the RPCNLD method, since this method is based on estimating the cost to construct an exact replica of the subject assets.

The use of the RCNLD method generally obviates the need for this argument since the RCNLD method is based on the cost to construct a substitute for the subject assets, and the hypothetical substitute often cures the supposed bad decisions made by the taxpayer company management.

For example, let's assume a machine can produce 100 widgets, but there is only demand for 50 widgets. The RPCNLD method would typically be based on the cost to recreate the 100-widget machine, and the value would be reduced for economic obsolescence due to overcapacity.

Alternatively, the RCNLD method may estimate the cost to recreate a machine capable of producing 50 widgets, so there would not be a need to estimate additional obsolescence related to excess capacity (i.e., supposedly poor management).

There are two potential problems with the assertion that the value decrement in the subject assets is related to management and not economic obsolescence.

First, the mere existence of overcapacity (for example) that occurs after the assets have been put in place does not prove taxpayer management made a bad decision. To blame management for a poorly conceived asset mix is to argue that the decision to invest in the particular assets was a demonstrably bad decision at the time it was made.

This argument fails to recognize that at any given point in time taxpayer management and other stakeholders are making the best decisions they can with the information that is available to them at that time.

In unit valuations, the subject assets are typically owned by large corporations with experienced executive management teams. It often takes months, or even years, from conceptualizing an investment decision to having those assets in place.

The investment decision may be subject to review by internal taxpayer management, external consultants, outside directors, equity owners, lenders, and other stakeholders. Presumably, none of these stakeholders want the taxpayer to make a bad investment decision.

Of course, industry and economy factors change over time and these external changes will affect how

historical investment decisions are perceived. What looked like a good investment decision on day one may look like a bad investment decision one year later.

However, if the investment decision was sound at the time it was made, it is disingenuous to blame management when external factors cause the taxpayer to earn a below-market rate of return on its investment.

In fact, external factors that contribute to low rates of return on assets are generally regarded as indicators of economic obsolescence (see Table 2) rather than indicators of poor management.

Second, this argument ignores the economic reality surrounding the assets as of the valuation date (such as overcapacity, for example).

The objective of unit valuations for property tax purposes is to estimate the value of taxpayer assets as of a specific point in time. The standard of value is often something akin to market value, which is often defined to consider the following factors:

- The transaction is between a willing buyer and a willing seller.
- Both parties are knowledgeable of all relevant facts and circumstances (both presently and prospectively).
- Neither party is under compulsion to buy or sell.
- The property is subject to a reasonable exposure time.

The valuation question is essentially some form of: What would the subject assets sell for? This question does not care what events led to the existence of the subject assemblage of assets.

It is not an internally consistent argument in a RPCNLD method to simultaneously conclude that:

1. the actual asset mix is less valuable than the RCNLD of the subject assets (due to poor management and not external factors) and
2. the market value of the subject assets, should ignore the RCNLD of the subject assets (the market value should simply ignore the supposedly poor management decisions).

The above assertion is inconsistent because it suggests that the hypothetical willing buyer would value the subject assets based on their reproduction cost while ignoring the actual utility of the subject assets (it would ignore the reproduction cost).

And, the above assertion suggests that a hypothetical willing buyer would pay for a 100-widget capacity even though there is only demand for 50 widgets.

Conclusion

There is a shortage of comprehensive authoritative literature dealing with the measurement of economic obsolescence in unit valuations prepared for property tax purposes. This is unfortunate since this topic is often a component of property tax disputes.

This discussion provides several procedural suggestions surrounding the identification and measurement of economic obsolescence.

Economic obsolescence analyses are necessarily quantitative in nature. However, a credible economic obsolescence analysis will also be supported with an analysis of the qualitative factors that contribute to the indicated economic obsolescence.

There are few absolutes when it comes to economic obsolescence analyses. Therefore, economic obsolescence analyses require the professional judgment of the experienced analyst.

This analyst judgment often requires thoughtfulness and creativity. This is because the taxpayer assets (1) are often special purpose in nature and (2) are often used in complex business operations.

Notes:

1. *Valuing Machinery and Equipment: The Fundamental of Appraising Machinery and Technical Assets*, 3rd ed., (Washington, D.C.: American Society of Appraisers, 2011), 80.
2. *The Appraisal of Real Estate*, 14th ed. (Chicago: The Appraisal Institute, 2013), 6.
3. "Industry Surveys—Telecommunications," S&P Capital IQ, January 2016, 9.
4. Ibid., 21–22.
5. Ibid., 24.
6. Ibid., 28.
7. Ibid., 38.
8. Ibid., 41
9. Ibid., 56.
10. "Industry Surveys—Oil, Gas & Consumable Fuels," S&P Capital IQ, December 2015, 5.
11. Ibid., 34.
12. *Valuing Machinery and Equipment: The Fundamental of Appraising Machinery and Technical Assets*, 3rd ed., 77.
13. *The Appraisal of Real Estate*, 14th ed., 635.

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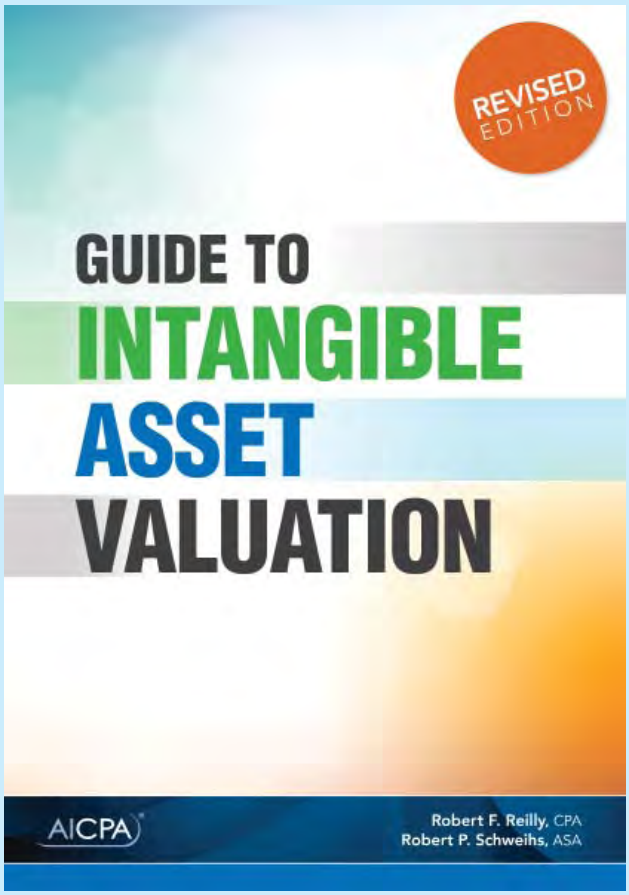
Guide to Intangible Asset Valuation

by Robert F. Reilly and Robert P. Schweihs



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Guide to Intangible Asset Valuation

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Considerations Related to the Valuation of Wireless Spectrum

Matt C. Courtnage and Stephen P. Halligan

In the valuation of wireless communications radio spectrum licenses, the general lack of available transactional market data often precludes an analyst from using the cost approach and may cause uncertainty in applying the market approach and the income approach. This discussion focuses on the characteristics of wireless spectrum licenses and on the generally accepted methods to address and account for the challenges in the valuation process.

Introduction

Wireless communications companies operate within a specific radio frequency bandwidth (i.e., "spectrum") that is regulated by the Federal Communications Commission (FCC). In other words, wireless communications companies need FCC spectrum licenses in order to operate. Accordingly, FCC spectrum licenses are a common intangible asset that is owned by wireless communications companies.

Wireless spectrum licenses are acquired through either (1) the primary market or (2) the secondary market. Transactions in the primary market occur by means of periodic FCC auctions. Transactions in the secondary market occur between private parties. Secondary market transactions are allowed if the parties involved conform to certain FCC restrictions on the spectrum licenses in terms of swapping or reselling.

Spectrum is a finite resource. Current technology limits the useable spectrum available to wireless carriers. Spectrum licenses allow a wireless carrier to utilize a specific portion of spectrum under the terms of the associated license. As a result of the scarce availability of spectrum licenses (as well as other factors), the prices for spectrum licenses can fluctuate significantly.

Because of the limited availability and related price volatility, many transactions—regardless of whether they take place in the primary or secondary market—may not provide meaningful evidence of current market value.

Assessing the value of intangible assets, such as spectrum licenses, is necessary in the assessment of state and local ad valorem property taxes. According to the *Guide to Intangible Asset Valuation*:

> The valuation of intangible assets is often an important aspect of the valuation of a taxpayer corporation that is subject to either the unitary principle or the summation principle of property tax assessment. This is because some jurisdictions tax intangible property at different rates than they tax tangible property. In addition, in some jurisdictions, certain intangible assets are exempt from state and local property taxation.[1]

Additionally, because spectrum licenses have an infinite useful life, licensees generally treat FCC licenses as indefinitely lived intangible assets under the provisions of Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) Topic 820, *Fair Value Measurements and Disclosures*. As indefinitely lived assets, FCC licenses are subject to annual impairment testing for financial reporting purposes governed by FASB ASC 350-30-35, *General Intangibles Other than Goodwill – Subsequent Measurement*.[2]

In this discussion, we will summarize two generally accepted valuation approaches and methods related to the analysis of spectrum licenses:

1. The market approach, and the guideline transaction method

2. The income approach, and the greenfield method (a discounted cash flow analysis)

These two valuation methods are well recognized spectrum license valuation methods.

A Spectrum Primer

To own and operate the radio frequency spectrum in the United States, wireless communications companies must:

1. be authorized by the FCC to operate the wireless network and
2. allow the usage of mobile devices in assigned spectrum segments.

Wireless system operators must comply with the rules and policies governing the use of the spectrum as adopted by the FCC.

Among other things, these rules and policies:

1. regulate wireless carriers' ability to acquire and hold wireless spectrum;
2. impose technical obligations on the operation of wireless carrier networks, including limits on radiofrequency radiation from (a) mobile phones and antennas, and (b) the location, lighting, and construction of antenna towers;
3. impose requirements on the ways in which wireless carriers are allowed to provide service to, and communicate with, their customers;
4. regulate the interconnection among wireless carriers; and
5. impose a variety of fees and charges on the wireless carriers' businesses.[3]

There is approximately 615 megahertz (MHz) of paired wireless spectrum available to wireless carriers in the United States. However, this entire spectrum cannot be utilized until wireless carriers deploy new technology.[4]

Thus, companies planning for the future are sometimes forced to pay for spectrum licenses that have no immediate benefit to their earnings.

According to an analysis done by J.P. Morgan, approximately 135 MHz of spectrum is allocated to 2nd and 3rd generation technologies, with the remainder allocated to 4th generation technology.

Of the 480 MHz allocated to 4th generation technology, they estimate that 100 MHz is not in use yet. This is because wireless carriers lack the network capability to utilize that spectrum.

FCC Wireless Spectrum Licenses

FCC spectrum licenses for wireless carriers to date are generally delineated into four primary classifications. These classifications are as follows:

1. Cellular
2. 700 MHz
3. Personal communications services (PCS)
4. Advanced wireless services (AWS)

Based on the individual licenses, the following factors vary for each wireless service offered: (1) the specific radio frequency and bandwidth of spectrum, (2) the size of the geographic areas in which the licensee is authorized to operate, and (3) the technical and service rules imposed by the FCC.

The four spectrum classifications noted previously are all based on the portion of the spectrum band offered by the license. The location on the spectrum band and the classification are as follows:

1. The 700 MHz band (both classification and location)
2. The 800 MHz band, traditionally known as cellular spectrum
3. The 1800–1900 MHz band, referred to as PCS spectrum
4. The 1700 MHz and 2100 MHz bands, known as AWS spectrum

The 700 MHz and cellular bands are better at penetrating buildings and travelling long distances (propagation). By comparison, the PCS and AWS bands are able to carry more data per given amount of bandwidth. However, their propagation properties are inferior. Therefore, these bands require more network infrastructure than the lower spectrum bands.

Although spectrum licenses are considered indefinitely lived assets, the FCC issues licenses for only a fixed period, generally 10 years. Therefore, a licensee must periodically seek renewal of its FCC spectrum licenses. Although the FCC has routinely renewed all of the wireless spectrum licenses that have come up for renewal to date, renewal challenges could arise in the future.

If a wireless license was revoked or not renewed upon expiration, the wireless carrier that held the license would not be permitted to provide services on the licensed spectrum in the area covered by that license. In addition, violations of the FCC rules may result in monetary penalties or other sanctions.

The licenses owned by wireless carriers apply to specific markets as designated by the FCC. The markets covered by each license can range from an

individual city, to a metropolitan area, to a multistate region. The FCC uses a variety of "market types" to characterize the geographic region that each license covers.

The following market types are associated with spectrum licenses, ranked by geographic size from smallest to largest:

1. Cellular Market Areas (CMAs) were created from the Metropolitan Statistical Areas defined by the Office of Management and Budget and Rural Service Areas. These were established by the FCC and they do not cross state borders.
2. Basic Trading Areas (BTAs) are based on the Rand McNally *1992 Commercial Atlas & Marketing Guide*.
3. Major Trading Areas (MTAs) are based on the Rand McNally *1992 Commercial Atlas & Marketing Guide*, extended and adjusted by the FCC.
4. Economic Areas (EAs) are based on the areas delineated by the Regional Economic Analysis Division, Bureau of Economic Analysis, U.S. Department of Commerce, extended and adjusted by the FCC.
5. Regional Economic Area Groupings (REAG) were created by the FCC staff and are an aggregation of EAs into 12 regions.

Spectrum Prices

Spectrum prices are generally quoted in terms of the following formula: price paid ÷ (population covered × bandwidth). This measurement covers the two characteristics that are most important in estimating the value of a specific license:

1. The number of people (the population) that the subject license covers
2. The size of the bandwidth offered by the license

All else being equal, the price paid for a license is positively correlated to both the population covered and the size of the bandwidth. For the purpose of this discussion, we refer to these license purchase prices as price/Pop×MHz. Dense urban areas with high populations tend to command the highest price/Pop×MHz bids.

A common market-based methodology to valuing wireless spectrum is to "bucketize" the licenses according to market type and population. For instance, an analyst may look at a historical transaction price for an AWS band license with a BTA market type covering a population of 75,000.

The analyst could then apply the transaction-based price/Pop×MHz to all other AWS band licenses with a BTA market type covering populations of say 50,000 to 100,000. With enough transaction data points, this methodology could then be extrapolated to cover all licenses by (1) band, (2) market type, and (3) population bucket.

Historically, the bands at the lower end of wireless spectrum (700 MHz and cellular) were considered the most valuable. The reason for this is that in order for a wireless carrier to have significant geographical coverage with limited tower infrastructure, they would require spectrum with good propagation characteristics. Any new entrant to the wireless market or a smaller provider looking to expand their coverage footprint would place a premium on the 700 MHz and cellular bands.

More recently though, the high frequency bands (i.e., AWS and PCS) have been commanding prices on par with, or even greater than, the low frequency bands. A primary reason for this development is that the major wireless carriers such as AT&T and Verizon already have nationwide coverage via low frequency band licenses. Their focus now is on better serving the urban areas.

The upward trajectory of consumers wireless data needs is requiring wireless carriers to build increasingly dense urban networks. With multiple wireless towers in urban areas, the carriers can then utilize the high frequency bands to meet the ever-rising customer data requirements, which cannot be met with low frequency bandwidth.

FCC Spectrum Auctions

Periodically, the FCC releases new spectrum in various frequency bands via auctions. For auctions where a significant amount of spectrum is being released, the auctions are highly competitive with

numerous qualified bidders. The auctions tend to stretch over several months with over a hundred bidding cycles completed before the auction is closed.

The auctions offer spectrum licenses for particular bands and the licenses are grouped into a number of individual blocks. These blocks are differentiated by three primary characteristics:

1. The license market type
2. The specific frequency
3. The bandwidth

Within each block, licenses are differentiated based on the geographic region they cover.

There were four significant (i.e., more than $2 billion raised) FCC auctions in the last 11 years. These auctions are summarized below:

- In 2005, the FCC held Auction 58. Auction 58 included spectrum in the PCS band. This auction was comprised of A, C, D, E and F block licenses that covered BTAs and MTAs and offered frequency blocks of 10 MHz, 15 MHz and 30 MHz. In total, the auction raised $2.04 billion.
- In 2006, the FCC held Auction 66. Auction 66 included spectrum in the AWS band. This auction was comprised of A through F block licenses that covered CMAs, EAs, and REAGs, and offered frequency blocks of 10 MHz and 20 MHz. In total, the auction raised $13.7 billion.
- In 2008, the FCC held Auction 73. Auction 73 included spectrum in the 700 MHz band. This auction was comprised of A through E block licenses that covered CMAs, EAs, and REAGs and offered frequency blocks of 6 MHz, 10 MHz, 12 MHz, and 22 MHz. In total, the auction raised $19.0 billion.
- In 2014, the FCC held Auction 97. Auction 97 included spectrum in the AWS band. This auction was comprised of A, B, G, H, I, and J licenses that covered CMAs and EAs and offered frequency blocks of 5 MHz, 10 MHz, and 20 MHz. In total the auction raised $41.3 billion.

There are a couple of important points to note. First, only one of these auctions occurred within the last seven years. Second, the trend in amounts raised by the FCC auctions appears to indicate that spectrum is becoming increasingly valuable. The implication of this trend is that older auctions become more of a reference point as opposed to meaningful pricing data points of current value.

Auction 97 results could serve as a meaningful price point for AWS band licenses and possibly as a reference to other bands. Relative band values, however, are very open to interpretation as the spectrum market continues to evolve in terms of supply and demand.

The scarcity of meaningful FCC auctions, in terms of valuation analysis, is further compounded by the fact that for three of the four primary band classifications, there are limited FCC auction pricing data for at least eight years.

Some Auctions Provide Less Meaningful Pricing Evidence than Others

While some auctions are very competitive, others are not. Regardless of whether or not the auctions are competitive, the results still may not represent a good indication of value for similar frequency licenses.

This can be for a number of reasons, but may include the following:

- Capital availability for wireless providers
- FCC regulations for the licenses being auctioned
- Technology required to utilize the licenses
- Restrictions on reselling or swapping

An example of an FCC spectrum auction that was not very competitive, and may not be a good indicator of license market value, was the case of FCC Auction 96.

Auction 96, the most recent PCS auction, closed in February 2014. In Auction 96, the FCC offered one block of EA licenses covering the entire country. The auction produced price/Pop×MHz results that were significantly below Auction 97 results and past PCS band transactions.

A number of factors contributed to the low prices paid for these licenses. These factors included the following:

1. None of the major wireless carriers participated in the auction—DISH Network L.L.C. (Dish) was the only winning bidder in the auction.
2. As a result of the auction, significant expenses were incurred in clearing incumbents from this band and bidders were subject to cost-sharing allocations apportioned on a pro rata basis against the relocation costs attributable to the band.

3. Winning bidders were required to deploy service to at least 40 percent of the population of an EA within four years after the license was granted and 75 percent within 10 years, thus potentially requiring significant infrastructure investment.
4. Dish was forced to relinquish a portion of the bandwidth it won to the FCC to complete the transaction.[6]

This auction produced price/Pop×MHz values that were significantly lower than more recent PCS band license indicators. The analyst may consider the relevant circumstances of the specific FCC auction data, or the secondary market data for that matter, to assess the extent that he or she should rely on that data to estimate market value for spectrum licenses.

Gross Bids versus Net Bids

There are two types of qualified bidders that participate in FCC auctions:

1. Gross bidders
2. Net bidders

Net bidder status is based on either (1) a small business designation or (2) rural carrier status.

Net bidders receive a discount that ranges from 10 to 25 percent off their gross bid amounts to determine what they would owe the FCC if they were to win a license during an auction. Gross bidders do not receive any bidding discounts.

The vast majority of all winning bidders are gross bidders. All major wireless carriers are gross bidders and, as a result, the most likely buyer of spectrum licenses will be a gross bidder.

Additionally, nearly all significant spectrum transactions in the secondary market are between gross bidders. The overall discount provided to net bidders in competitive FCC auctions generally represents less than 10 percent of auction proceeds and often only a few percent.

Net bidders are faced with many constraints imposed on their spectrum licenses by the FCC that are not applicable to gross bidders.

These constraints include the following:

1. If the net bidder does not have wireless infrastructure to utilize the spectrum licenses within a set period of time, they may have to forfeit the spectrum license.
2. There are restrictions on how soon the net bidder can resell their spectrum licenses on the secondary market, primarily to prevent the buyer from simply flipping the license for a profit.

The valuation analyst should understand the difference between using gross bids and net bids when analyzing FCC auction data.

Secondary Market Spectrum Transactions

Analysis of secondary market transaction data comes with its own set of challenges. Companies can acquire spectrum licenses through a variety of transactions in the secondary market. However, the majority of those transactions may not be accompanied by sufficient data to aid in the valuation process.

This lack of available data may result from circumstances such as the following:

1. Company A acquires Company B. The deal includes all of the Company B spectrum licenses, but no spectrum specific values are provided.
2. Company A and Company B both own spectrum licenses. They swap licenses to meet certain geographical or spectrum band needs, but no additional consideration is exchanged.
3. Company A acquires spectrum licenses from Company B. Neither Company A nor Company B chooses to divulge the transaction details.
4. Company A acquires spectrum licenses from Company B. The transaction is a combination of (a) too small, (b) too geographically limited, or (c) too strategic in nature to have meaningful pricing points for general spectrum valuation analysis.

It is important to note that if two companies do swap two different spectrum band licenses, and enough information is provided, the transaction can serve as a reference point to the relative value of those two bands.

During the past three years, based on our research, there were only two secondary market spectrum license transactions that were over $1 billion and covered substantial geography:

1. Announced during the first quarter of 2013, Verizon sold 39 700 MHz B block spectrum licenses to AT&T Inc. (AT&T) in exchange for a payment of $1.9 billion and the

transfer by AT&T to Verizon of AWS (10 MHz) licenses in certain markets in the western United States.

Verizon also sold three lower 700 MHz B block spectrum licenses to an investment firm for a payment of $0.2 billion. As a result, Verizon received $0.5 billion of AWS licenses at market value.

Based on the information disclosed, the transaction was valued at approximately $2.6 billion.[7]

The transaction was finalized during the third quarter of 2013.

2. On January 6, 2014, Verizon announced that it had entered into two agreements with T-Mobile with respect to its remaining 700 MHz A block spectrum licenses.

   Under one agreement, Verizon sold certain of these licenses to T-Mobile in exchange for cash consideration of approximately $2.4 billion, and under the second agreement Verizon exchanged the remainder of these licenses for AWS and PCS spectrum licenses.

   The latter agreement represented an exchange of $950 million of AWS and PCS spectrum licenses according to investor material published by T-Mobile.[8]

   Based on the information disclosed, the transaction was valued at approximately $3.3 billion. The transaction was finalized on April 30, 2014.

While both of these transactions are relatively recent and significant in size, the pricing data points are limited to only two out of six existing blocks on the 700 MHz band.

One approach to valuing the rest of the 700 MHz band would be to compare the transaction prices for these blocks to the prices originally paid for these licenses by Verizon in FCC Auction 73. For example, let's suppose that Verizon paid $2.5 billion for A block spectrum licenses in Auction 73. Based on the sale of these licenses to T-Mobile for $3.3 billion, that price would indicate that the licenses had appreciated by 32 percent since the time they were originally purchased.

The 32 percent price premium for the 700 MHz band A block licenses could hypothetically be applied to other 700 MHz licenses sold in Auction 73.

Cellular Band Pricing

Nearly all the cellular band licenses owned by wireless carriers were awarded via comparative hearings and lotteries. The only auctions that did offer cellular band licenses contained limited licenses and few bidders and, therefore, may be considered less relevant in terms of determining market prices. Our research did not identify any secondary market transactions involving cellular spectrum.

The 700 MHz and cellular bands both reside on the low end of the spectrum range utilized by wireless carriers. This 700 MHz band begins at 698 MHz and ends at 793 MHz. The cellular band has two blocks, the first residing at 824-849 MHz and the second at 864-894 MHz. Because the 700 MHz and cellular bands have similar frequencies, they also have similar propagation and capacity characteristics.

It may be appropriate for a valuation analyst to estimate cellular license pricing based on 700 MHz license pricing for the following reasons:

1. The radio frequency proximity of these bands
2. The lack of any meaningful cellular band auction
3. The lack of any cellular band transaction data

A related consideration may be the identification of whether the two bands are comparable in pricing, or if one band carries a premium over the other band.

PCS Band Pricing

There are relatively few PCS band pricing indicators. The last substantial and competitive FCC auction involving PCS band spectrum licenses occurred in 2005. Additionally, there have not been a significant number of quality recent secondary market indicators.

The AWS band resides on the high end of the spectrum utilized by wireless carriers, and effectively straddles the PCS band. On the lower spectrum frequencies, the AWS band begins at 1710 MHz and ends at 1755 MHz. At the higher end of the spectrum, the AWS band begins at 2110 MHz and ends at 2155 MHz. The PCS band resides between these frequencies, and begins at 1850 MHz and ends at 2000 MHz.

Similar to the pricing assumption mentioned above for cellular band licenses, a similar analogy could be made for the PCS band licenses. It may be appropriate to assume PCS license pricing approximates AWS license pricing based on the proximity of the AWS and PCS bands on the spectrum. Determining the degree to which pricing for the two bands is comparable is open to interpretation and will require analyst judgement.

Using the Greenfield Method to Estimate Value

In the process of valuing wireless spectrum licenses, using the market approach may seem to be the preferred methodology. The data used in the market approach may not be comparable to a taxpayer's spectrum license, or the data may be outdated. This may occur because of changes in the competition and marketplace from the:

1. unique characteristics associated with each band of wireless spectrum (e.g., permitted uses, propagation and regional limitations) and
2. infrequent administration of spectrum license auctions and/or resale of spectrum licenses, the data used in the market approach may not be comparable to a taxpayer's spectrum license, or the data may be outdated due to changes in the competition and marketplace.

As a result of the difficulty in finding comparable and recent market data, analysts may rely on the income approach to estimate a value for spectrum licenses. Using the income approach to value spectrum licenses is challenging. This is because the income stream associated with the spectrum licenses needs to be isolated, excluding any going-concern value from the existing business or any other asset. In order to estimate this value, one method commonly used is the greenfield method (GFM)—a similar method to the discounted cash flow (DCF) model.

The GFM is based on the value of a hypothetical start-up company. The start-up company is assumed to begin operations on the valuation date, with no revenue or assets to speak of, and is burdened with developing an undeveloped or "greenfield" business.

In order to isolate the value associated with the individual asset (i.e., the set of spectrum licenses), the analyst assumes that the start-up company does not own the subject spectrum licenses, but rather, the start-up company must apply for, and obtain, the spectrum licenses on the valuation date (i.e., time zero).

Starting the valuation with these base assumptions, and projecting the operations of the start-up company going forward, removes any going-concern and goodwill value that may typically be accounted for in other generally accepted valuation methods.

Under the GFM, there are a number of assumptions made that reflect the expectations of a true start-up wireless operator. These assumptions are made with the underlying intent to develop an

operation comparable to the one in which the subject asset is currently utilized. These assumptions account for the initial start-up costs and losses required to purchase, build, or lease the assets needed to operate and build an operation similar to the current subject asset's operation.

Essentially, over the forecast period, the balance sheet of the wireless start-up is augmented with capital expenditures and normal periodic expenses to produce a larger balance sheet with a full complement of assets.

The remaining cash flow resulting from the start-up company's operations, after the operating expenses and capital charges are accounted for and deducted, are presumed to be derived from the one asset that existed at time zero of the analysis. The indicated value of the single asset is derived when the remaining cash flow is discounted back to time zero.

One of the primary assumptions associated with the greenfield method is that the start-up company is owned by a larger parent company that provides several competitive advantages. These competitive advantages include the following:

- Readily available capital and financing for the start-up's endeavors
- A lower cost structure with regards to capital expenditures
- A limited learning curve

The patronage and tutelage of the parent company provide key competitive advantages that account for the rudimentary issues a new start-up would likely encounter if they were to enter the market unassisted. Typically, a new start-up would run into funding and capital issues, as the capital intensity required to build a wireless network is comparatively high to other industries, and the likelihood of a start-up with no revenue receiving this level of funding is unlikely.

Additionally, due to the association with the larger parent company, the management team is assumed to have significant industry experience and sufficient knowledge of the industry, allowing them to quickly and effectively develop the company.

Application of the GFM involves a top-down analysis, meaning the initial assumptions and forecast period begin with broad-based assumptions and, over the course of the projection period, the assumptions are refined to a more granular level of detail.

The following list details the assumptions that likely need to be addressed in the application of the GFM:

- What are the total projected revenues in the market?
- How much market share is available to the owner of the license and what is the expected user-acquisition rate?
- What is the duration and cost of building out an operating wireless infrastructure?
- What are the personnel and operating requirements to create a comparable operating entity?

The starting point for a GFM analysis is the forecasting of total market revenue and expected market share. Over the projection period, cash flow is forecast assuming the existing competitive situation continues within each market. Certain market factors and trends that can influence the current state of the industry, which should be considered in the projection period, are the following:

- The level of direct and substitute competition on a regional and national basis
- The likelihood of another spectrum license auction or sale occurring
- Potential changes in consumer demographics and tastes
- Macroeconomic conditions
- Legal or regulatory factors

The examples included above are not all-inclusive, and in the application of the GFM, the analyst should consider any relevant events and circumstances that may significantly affect the inputs used to estimate the value of the licenses.

During the initial years of operation, revenue is expected to be minimal due to a relatively small market share. Additionally, initial cash flow would likely be negative due to the high required capital outlays associated with starting a new operation. Over the projection period, revenue would increase on par with the customer base until operating cash flow reaches a normalized level.

The normalization and stabilization of revenue and cash flow should be based on what is realistically possible in the current operating conditions of the market, and not necessarily consistent with what the actual license-holding company is able to currently generate.

The next step in the GFM analysis is the forecasting and modeling of the costs associated with the build-out of a wireless network infrastructure. The analyst should account for the costs associated with building, leasing, or acquiring the necessary tangible assets. The projections for tangible asset expenditures should include the expected costs for towers, transmission lines, transceivers, switches, antennae, buildings and improvements, and various other capital assets.

In addition to the required tangible asset expenditures, the appraiser should also consider the expected time required to construct or acquire these assets. Based on the expected timelines and implementation requirements of the capital expenditures and tangible assets, it is likely that the capital outlays for the wireless network would be the greatest nearer the beginning of the projection period and would decrease over time. It is also common to project different phases of capital expenditure investments based on the company's expected growth and financial performance.

The final step in the GFM analysis is the estimation and projection of the operating expenses that will be incurred during the build-out period. The start-up company will have increasing personnel and advertising needs associated with the acquisition of subscribers and the retention of a customer base.

Additionally, there will be other operating expenses incurred by the company that should be accounted for in the projections. These expenses can include, but are not limited to, salaries, utilities, legal and professional fees, and regulatory fees and permits. These expenses should be expected to increase throughout the build-out phase, as the company begins and expands its operations.

Once the assumptions and likely expectations have been incorporated in the model, the final step in the GFM is to estimate an appropriate discount rate. As discussed previously, the value of the company's spectrum license is estimated as the net present value of future cash flow discounted at an appropriate required rate of return.

Complications arise in the estimation of an appropriate discount rate. This is because the discount rate for the spectrum license is likely to be materially different from that of the subject taxpayer's company. The discount rate estimated for the GFM should encompass and account for the start-up

related risk, as well as the risk associated with the spectrum license being the sole asset.

An in-depth analysis discussing the estimation of an appropriate discount rate is beyond the scope of this discussion. However, based on the aforementioned assumptions, the discount rate associated with this intangible asset is likely to be much higher than the discount rate for the subject taxpayer company.

Summary of the Greenfield Method

Overall, the application of the GFM is a complicated process. Although the method is fundamentally based on a generally accepted economic principle (i.e., the value of an asset is equal to the present value of its future cash flow), the application of this approach requires a prediction of future cash flows, which are difficult to accurately assess.

While the DCF model relies primarily on assumptions that company management may have readily available, such as the company's required rate of return and financial projections, the assumptions used in the GFM are typically not readily available or specifically analyzed by management.

Because of those limitations, identifying reasonable and reliable data for the GFM may require significant market research and analysis. Furthermore, the inherent sensitivity of the GFM, and its value conclusion, to these assumptions leads to increased subjectivity in the final determination of the subject asset's value.

Despite the limitations of the GFM, if conducted appropriately, the method yields a theoretically sound valuation of the isolated spectrum licenses. Based on this information, the application of the GFM is most appropriate when the analyst is knowledgeable about the industry and can reliably estimate future costs and benefits.

Conclusion

As identified throughout this discussion, valuations of wireless spectrum licenses are performed for a number of different reasons, such as providing useful data with regards to primary and secondary market transactions, as well as for the annual assessment of intangible asset impairment and for ad valorem property tax purposes.

The valuation of wireless spectrum licenses presents analysts with a complex and challenging set of practical and theoretical valuation issues. It is important that the analyst be aware of, and recognize, the challenges associated with the related issues in the valuation process.

There is no single method for valuing spectrum licenses. The four previously discussed bands of wireless spectrum—cellular, 700 MHz, PCS and AWS—all have unique characteristics. These unique characteristics may affect the appropriate valuation method, the interpretation of available data, and the processes and assumptions used to value each license.

Additionally, the infrequent sale of wireless spectrum in both the primary and secondary markets results in additional data analyses and interpretation challenges.

This discussion summarized two generally accepted valuation approaches and methods related to the analysis of wireless spectrum licenses:

1. The market approach, and the guideline transaction method
2. The income approach, and the greenfield method

It is important to note that the use of these methods, and the value indications provided by each, can vary significantly. Due to the complexity surrounding wireless spectrum licenses valuations, reliance on a single method or single transaction can yield unreliable conclusions of value.

It is generally accepted for the analyst to utilize multiple valuation methods, and to consider the value indications concluded by each in order to provide an estimate for the final value conclusion.

Notes:

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Consideration for Developing a Cost of Equity Capital for Electric Cooperatives

Stephen P. Halligan and Terry G. Whitehead

One consideration in the analysis of an appropriate present value discount rate for an electric cooperative is the fundamental difference in operating structure of a not-for-profit corporation compared to the typical for-profit, shareholder-owned business.

Overview

The generally accepted income approach valuation methods for property tax purposes include the yield capitalization method and the direct capitalization method.

When using the income approach to estimate the unit value of a taxpayer company, one issue is the quantification of either a present value discount rate or a direct capitalization rate.

The estimation of an appropriate discount rate or capitalization rate involves a necessary level of subjectivity and consideration of company-specific factors. The inherent nature of an electric cooperative (EC) compounds this already subjective component by presenting additional considerations in the process of estimating these specific rates.

Electric cooperatives apply a business model that is not always consistent with the underlying operating principles utilized by standard for-profit businesses.

There are additional considerations related to electric cooperative business operations, including the following:

1. The fundamentally different value propositions of consumer-owned electric cooperatives, as compared to investor-owned businesses
2. The organizational differences of cooperatives and the potential impact on the calculation of the weighted average cost of capital

These considerations may lead the valuation analyst to question whether certain generally accepted procedures in a unit valuation are similarly appropriate for the subject EC.

This discussion summarizes the additional considerations associated with developing a required rate of return on equity for an EC.

Introduction

States commonly assess the value of utility company property on an annual basis for ad valorem tax purposes. This value assessment often involves the valuation of taxpayer property based on the unit valuation principle.

The three generally accepted unit valuation approaches are the sales comparison approach, the cost approach, and the income approach.

The perceived simplicity and general availability of valuation model inputs make the income approach appropriate to estimating the value of the taxpayer total unit of operating assets (i.e. the unit value).

A significant component in applying the income approach is the estimation of an appropriate present value discount rate.

The appropriate present value discount rate should consider the following:

1. Alternative market rates of return
2. The perceived risk of the taxpayer company cash flow

In the business valuation discipline, analysts frequently complete a formula-based analysis of discount rates referred to as the weighted average cost of capital (WACC).

In the property tax unit valuation discipline, this formula may be classified as either a *band of investment* formula or a WACC.

Generally, these terms and formulas to estimate rates of return are considered to be synonymous. Throughout this discussion, we use the term WACC.

The basic elements of yield capitalization rates are the debt yield and the equity yield. When these rates are combined, they indicate the overall investment yield. This cost of capital analysis is "weighted" because it incorporates the percentage of the total investment that debt contributes and the percentage that equity contributes, which is a weighted-average concept.

One consideration in the assessment of an appropriate discount rate for an EC is the fundamental difference in operating structure as a not-for-profit corporation compared to the typical for-profit, shareholder-owned business. In general, the goal of a for-profit business is to maximize shareholder wealth and generate returns in excess of the WACC.

However, due to fundamental differences, an EC does not operate in a similar shareholder *wealth* maximization manner. Instead an EC operates to maximize each member's *benefit*. These organizational objectives diverge from each other in subtle yet potentially significant aspects.

Additionally, the risk-return profiles used in the calculation of a WACC are typically based on for-profit, shareholder-owned companies where the primary business relationship is one in which the service provider and service consumer are independent of each other.

The primary business relationship for an EC, however, is one where the consumers are not independent of the providers. The EC consumers are, in fact, also the owners of the business. The blending of owner and consumer motives complicates the estimation of the unsystematic risk associated with an EC.

There are several well-developed theories and generally accepted models for estimating the cost of equity capital, including the build-up method (BUM), capital asset pricing model (CAPM), and implied models using market-derived pricing evidence (e.g., Gordon growth model).

This discussion examines and compares the fundamental differences of an EC and the potential impact on the cost of equity capital. This discussion also addresses potential adjustments and considerations when developing an EC cost of equity for use in the income approach.

What Are Electric Cooperatives?

As described by the National Rural Electric Cooperative Association (NRECA), rural electric cooperatives ("RECs" or "electric cooperatives") are private, independent, nonprofit electric utility corporations.[1]

RECs are generally established to provide reliable and affordable electricity in areas where the return on the infrastructure investment was not high enough to attract investor-owned utilities (IOUs).

RECs are distinctly different from their IOU counterparts in three ways:

- First, RECs function under a cooperative business model in which the consumers own the utility rather than investors or municipalities.
- Second, RECs were created specifically to serve rural areas where investor- or municipal-owned electric companies did not offer electrical service.
- Third, Congress specifically designated RECs as tax-exempt nonprofits under Section 501(c)(12)(C) of the Internal Revenue Code, the RECs technically have been exempt from federal taxation since the Revenue Act of 1916.[2]

  Additionally, Congress created a program of federally subsidized loans to speed the electrification of rural America.

Table 1
Comparison of Operational Characteristics between Different Business Forms

Features	Sole Proprietorship	Partnership	Investor-Owned	Electric Cooperatives
Who owns the business?	The individual	The partners	The stockholders	The member-consumers
Who uses the services?	Generally nonowner consumers	Generally nonowner consumers	Generally nonowner consumers	Chiefly the members
Who votes?	NA	The partners	Common stockholders	The member-consumers
How is voting done?	NA	By the amount of business owned	By shares of common stock	One vote per member, or by amount of business
Who determines policies?	The individual	The partners	Common stockholders and directors	The members
Are returns on ownership capital limited?	No	No	No	Yes, usually 8 percent or less
Who gets the net margins?	The individual	The partners in proportion to the amount of business owned	The stockholders in proportion to the number of stock shares owned	The members based on the amount of business done with the cooperative

The EC business model is distinctly different compared to IOUs and other for-profit corporations. The traditional value proposition of a cooperative business is one in which the business is organized and run for the benefit of its members. In order to provide this value proposition, electric cooperatives act and operate as an agent of the consumer-members, buying power in bulk and distributing it to rural customers.

The rates for the power sold are established by the local cooperative's board of directors, which is constituted primarily of members of the cooperative. The rates are designed so that (1) revenue exceeds the actual costs of providing dependable electric service and (2) the EC meets its scheduled payments on loans.

The net margin left over after expenses and loans are paid is reallocated back to members of the cooperative in the form of capital credits, commonly referred to as "patronage refunds." Cooperative members receive their pro rata share of the net margin based on the amount of electricity they have used during the allocation period. This return of capital maintains the nonprofit status of the electric cooperative.

How Are Electric Cooperatives Different from Other Forms of Business?

An EC possesses certain operational characteristics that differ from the traditional business models. Table 1 is based on a resource manual produced by the Oklahoma Association of Electric Cooperatives.[3]

Table 1 presents a comparison of the following specific attributes of the related business entity types:

1. A sole proprietorship
2. A partnership
3. An investor-owned business
4. An electric cooperative

Electric cooperatives are owned by the member-consumers. Membership and joint ownership are open to all who want to use the cooperative's services, and are usually permitted entrance into the cooperative after a small membership fee is paid.

Electric cooperatives are democratically controlled by their members. In order to ensure this, each member of a cooperative has only one vote,

regardless of the number of accounts owned or the amount of electricity purchased. This operating structure differs from the typical business structure, where voting, and the number of votes, is commonly based on proportional ownership.

One important distinction of an EC is that its returns on equity are limited to a maximum of 8 percent. This requirement further differentiates an EC from its for-profit counterparts. In general, for-profit entity shareholders have separate goals from their customers (i.e., shareholders want greater returns on equity, while customers want better prices or services), and these goals are often at odds with each other.

Conversely, limiting the returns on ownership capital in an EC, further aligns the interests of the owners and consumers.

In order to consider how these fundamental differences may affect the income approach, it is necessary to understand the assumptions inherent in the different models used to estimate yield capitalization rates and direct capitalization rates.

The Capital Asset Pricing Model

The CAPM is a generally accepted method used to estimate the cost of equity capital. The focus of this discussion is to understand the basic concepts of the CAPM, the underlying assumptions inherent in those basic concepts, and the application of the CAPM as it relates to the valuation of the taxpaying electric cooperative's assets. Therefore, this discussion only includes a simplified description of the CAPM.

The CAPM is defined as follows:

> A model in which the cost of capital for any stock or portfolio of stocks equals a risk-free rate plus a risk premium that is proportionate to the systematic risk of the stock or portfolio.[4]

Simply stated, the CAPM reflects the relationship between a certain type of risk and expected return. Investors require a greater return for an investment in perceived risky assets but are likely to accept a lower return for an investment in perceived less risky assets. The CAPM was developed under the assumption of a diversified market portfolio.

The diversified market portfolio includes all types of risk profile securities. This is an essential foundational concept of the CAPM. In a typical corporation, the corporation assets are not part of a diversified portfolio. Instead, the corporation assets are typically concentrated in a single industry and owned by a single company.

The CAPM formula for estimating the cost of equity capital is presented as follows:

$$K_e = R_f + \beta \times RP_m$$

where:

K_e = Expected return for an individual security

R_f = Rate of return available on a risk-free security

β = Beta

RP_m = Equity risk premium (ERP) for the market as a whole[5]

The three primary components of the CAPM are the following:

1. The risk-free rate
2. The market-derived equity risk premium
3. The selected beta

The risk-free rate reflects the minimum return an investor expects to receive from his or her investment, based on the impact of inflation over time and their expectations for the real rate of interest on money.

The market-derived equity risk premium is the market return that an investor expects over the risk-free rate by investing in the market portfolio which, as previously mentioned, consists of a fully diversified portfolio.

The beta component of the CAPM indicates the subject security's sensitivity to the market. This variable calculates the amount of expected systematic risk, or market risk, for the subject security.

The three components of the CAPM collectively compensate the investor for the assumed risk he or she takes by investing in the subject security.

Because the risk of the subject security, as measured by the CAPM, is based on its relationship to the diversified portfolio, it assumes that the unsystematic risks (i.e., company-specific risks), are diversified away. Therefore, in the CAPM, the investor is only compensated for the systematic risk.

The unmodified version of the CAPM assumes that the only component of risk that investors care about is the risk of the market (i.e., systematic). In practice, however, it is common to adjust the CAPM to reflect different risk-return profiles based on:

1. the size of the subject company and
2. the subject company-specific risks.

Many empirical studies have been performed since the CAPM was originally developed and have concluded that realized total returns on smaller companies have been substantially greater over a long period of time than the pure CAPM would have predicted.

The betas for small companies tend to be greater than those for large companies. However, these higher betas do not account for all of the risks faced by those who invest in small companies.

The premiums associated with smaller companies reflect the uncertainty of continued operations and the expected return for such risk as expected by market participants.

As companies increase in size, the premium associated with the uncertainty of future operations is generally expected to decrease. This risk premium is sometimes referred to as the small stock equity risk premium (the "size premium").

According to the *Guide to Property Tax Valuation*, the company-specific risk premium (CSRP) is:

> the risk that makes an investment in the subject taxable property (1) unique and (2) different from any benchmark investments that are used to measure capitalization rates, valuation pricing multiples, and other valuation pricing metrics.[7]

Put another way, the CSRP adjusts the cost of equity in order to derive a required rate of return commensurate with the total level of investment risk associated with the subject company investment. Investors typically expect to be compensated for this risk and it is common to adjust the CAPM for this company-specific risk.

The modified capital asset pricing model (MCAPM) seeks to incorporate these additional risk considerations in the quantification of a required rate of return.

The MCAPM formula is presented as follows:

$$K_e = R_f + \beta \times RP_m + RP_s \pm RP_c$$

where:

K_e = Expected return for an individual security

R_f = Rate of return available on a risk-free security

β = Beta

RP_m = ERP for the market as a whole

RP_s = Risk premium for small size

RP_c = Risk premium attributable to other company-specific risk factors[8]

Considerations with Using the MCAPM for Electric Cooperative Valuations

As discussed previously, electric cooperatives, and cooperatives in general, operate under fundamentally different value propositions than most investor-owned for-profit businesses. As a result, using the MCAPM to estimate a required rate of return for an EC may require additional considerations.

These considerations include the following:

1. Whether or not the fundamental objective of electric cooperatives precludes them from the addition of size premiums
2. Whether or not the separation, or lack thereof, between the electric cooperative members, providers, and consumers, precludes them from the application of industry-specific or other company-specific risk premiums
3. Whether or not the use of a proxy beta overestimates the market risk associated with an electric cooperative, thereby overestimating the required rate of return.

The following sections address each of the above identified considerations as they relate to an EC.

Size Premium

The size premium, as mentioned previously, is reflective of the uncertainty related to continued operations and the expected return for risk of a smaller company. This is a result of the generally recognized additional factors inherent in smaller companies.

This premium recognizes that, in general, smaller companies have:

- less resources and access to capital than their larger counterparts;
- less money to spend on research and development, advertising, and human capital;
- a greater dependency on fewer customers; and
- less resources to fend off competition and redirect themselves after changes in the market occur.[9]

All of these characteristics relate to a greater degree of difficulty for smaller companies to sustain their cash flows and return value to the owners. Assuming these smaller company risks are similarly true and attributable to an EC, however, may be inappropriate.

While it may be true that a smaller EC may have less financial resources than its larger publicly traded counterparts, it is not necessarily appropriate to assume that they are disadvantaged or less competitive based merely on a comparison of size. One benefit of more resources for a larger company is that it provides benefits and opportunities against competitors.

An increase in a subject company's competitive advantages is generally expected to benefit the subject company and potentially increase the return to shareholders. This benefit would lower the overall risk associated with the subject company. An EC is based in a rural area where the IOUs deemed it was unprofitable to operate.

This locational factor results in a market where either:

1. there is no such competition or
2. the intensity of rivalry is substantially less.

Additionally, since the consumers of the cooperative's electricity are also its owners, and operate under a not-for-profit incentive, it is unlikely that an IOU would provide more profitable benefits to a cooperative's consumers.

Company-Specific Risk Premium

As identified previously, the CSRP is reflective of the investment- or company-specific factors that investors expect to be compensated for investing in the subject company.

The CSRP is, however, a subjective assessment, and it is generally based on an analyst's informed assessment of the investment-specific internal and external factors facing the subject company.

When estimating a CSRP for an EC, there may be additional factors to consider. In general, company-specific risk factors include, but are not limited to, the following:

- Key person dependence
- Key supplier dependence
- Key product or technology dependence
- Management ability and depth
- Pending regulatory changes
- Pending litigation
- Abnormal present or pending competition
- Lack of diversification (customer, geographic, etc.)

Company-specific risk factors are generally compared to the risk attributes of a benchmark investment. In comparing electric cooperatives with selected guideline companies, or benchmark investments, the fundamental operating differences of an EC should be considered.

An important company-specific risk factor is the ability and depth of management. The basis upon which an EC is operated (for the benefit of the members and not necessarily a profit) may result in potential inefficiencies. Cooperatives that operate without a significant level of competition, and operate with the intent to maximize member benefits rather than shareholder wealth, may not critically scrutinize operational inefficiencies that would increase their return on investment.

Studies have been performed to research and compare the financial performance of cooperatives to their investor-owned counterparts. One such study was performed by McKinsey & Company. That study concluded that the cooperative business models "destroy value" amounting to nearly $2 billion for agricultural cooperatives alone between 1999 and 2000.[10]

Proxy Beta

Another necessary factor in the estimation of an appropriate cost of equity is the adjustment for industry market risk. Using a proxy beta, derived from guideline companies or other available market data, in the MCAPM may not appropriately consider the industry market risk associated with the EC. Stock prices fluctuate as a result of a number of different factors that are not necessarily related to the income-producing potential of the subject company or to industry-related influences.

These factors may include the following:

- Changes in the comparable public company management
- Potential merger and acquisition activity by the guideline company or a competitor
- Changes in a guideline company's secondary line of business
- Exogenous macroeconomic data (e.g., changes in the federal funds rate)

As a result of the combined owner/consumer operations of an EC, the influence of industry factors may not affect the EC in a similar manner as the other industry companies.

Therefore, in order to account for differences between the risk attributable to a proxy beta and the relative industry risk impact on the EC, it may be necessary to adjust the CSRP for the subject company EC.

Summary and Conclusion

When estimating the cost of equity capital and related discount rates and direct capitalization rates for an EC using the MCAPM, it is important to recognize the operating differences between an EC and the comparative for-profit companies.

It is also important to consider the relevance of the underlying empirical data that is generally relied upon to estimate the various components within the MCAPM in an analysis of the EC cost of equity capital. This discussion is not intended to provide an all-inclusive list of factors to consider.

In addition to the factors identified in this discussion, there are additional issues that may affect and influence the estimation of an appropriate cost of equity capital for an EC. The differences inherent in the EC business model raise many questions related to the benchmark data often relied upon to estimate a required rate of return.

Consideration of the facts and circumstances influencing the taxpayer company's total unit of operating assets may be an important step in ad valorem tax valuations. It is important to reconcile the empirical data relied upon with the operating characteristics and risks of the taxpayer company's taxable unit.

An understanding of the EC business model is essential in order to estimate an appropriate required rate of return. A clear understanding of potential EC-related factors and a specific identification of how the identified factors affect a selected rate of return, will assist the analyst in the preparation of a credible and reliable unit valuation analysis.

Notes:

1. "America's Cooperative Electric Utilities—The Nation's Consumer Owned Electric Utility Network," National Rural Electric Cooperative Association, www.cooperative.com (March 2016): 1.
2. See Internal Revenue Code, 26 U.S.C. §501(c)(12)(C)(2012), and Revenue Act of 1916, Pub. L. 64-271, 39 Stat. 756,767 (codified as amended at 26 U.S.C §501(c)(12) (2012)).
3. "Resource Manual," Oklahoma Association of Electric Cooperatives (2014).
4. Shannon Pratt and Roger Grabowski, *Cost of Capital*, 5th ed. (New York: John Wiley & Sons, 2014).
5. Ibid., 192.
6. Duff & Phelps, *2015 Guide to Cost of Capital Handbook*.
7. Robert F. Reilly and Robert P. Schweihs, *Guide to Property Tax Valuation* (Chicago: Willamette Management Associates, 2008), 163.
8. Pratt and Grabowski, *Cost of Capital*, 5th ed., 197.
9. Duff & Phelps, *2015 Valuation Handbook: Guide to Cost of Capital.*
10. Jack J. Dempsey, Ashish A. Kumar, Bernard Loyd, and Loula S. Merkel, "A Value Culture for Agriculture." *McKinsey Quarterly* 3 (2002).

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Measuring the Discount for Lack of Marketability for a Closely Held Taxpayer Company

Robert F. Reilly, CPA

A valuation analyst (analyst) often has to value the total operating property of a closely held company for various property-taxation-related reasons. This type of valuation occurs when the taxpayer is assessed on a unit valuation basis. In a unit valuation, the value of all of the taxpayer's income-producing property (real and personal; tangible and intangible) is valued collectively as a single integrated "unit" of operating assets. In such analyses, the analyst may initially conclude the value of the closely held taxpayer company on a marketable basis—that is, as if it was a publicly traded company. This value result occurs if the analyst relies on stock market data to extract pricing multiples, present value discount rates, and direct capitalization rates. If this is the case, the analyst may have to apply a valuation adjustment to this initial value indication in order to conclude the value of the taxpayer business entity on a nonmarketable (i.e., closely held) basis. This discussion considers the factors that the analyst typically considers to measure the discount for lack of marketability (DLOM) related to the unit valuation of the taxpayer closely held business entity.

Introduction

A valuation analyst (analyst) often has to value the closely held taxpayer company for various property tax planning, compliance, and controversy purposes. Often, the valuation subject is the taxpayer's total bundle of operating assets (both tangible assets and intangible assets), working collectively as a single unit of income-producing properties.

This type of analysis is particularly relevant to corporate taxpayers that are assessed on a unit valuation basis. In the unit valuation, the taxing authority (or the analyst) values all of the taxpayer's total operating property collectively, as a single integrated "unit" of operating assets.

State and local taxing authorities often assess "utility type" taxpayers based on this unit valuation basis.

Such "utility type" taxpayers typically include railroads, airlines, other transportation companies, electric companies, telecom companies, pipelines, and cable TV companies. Assessing authorities also may assess entertainment venues, sports facilities, hospitals, and other health care facilities.

The analyst may initially conclude the value of closely held taxpayer company "unit" of assets on a marketable basis depending on:

1. the unit valuation approaches and methods applied and
2. the benchmark valuation data used.

For purposes of this discussion, a "marketable basis" means "as if the taxpayer company was traded on a public stock exchange."

Of course, the closely held taxpayer company is not traded on a public stock exchange. Rather, the taxpayer unit of operating assets is owned by a closely held company.

It is noteworthy that even if the taxpayer's parent corporation is publicly traded, the actual

property owner taxpayer may be a closely held subsidiary company.

And, certainly, the taxpayer's operating assets are not traded on a public stock exchange. In such a valuation case, the analyst may have to apply a discount for lack of marketability (DLOM) valuation adjustment to the initial value indication in order to conclude the fair market value of the taxpayer unit of operating assets.

The difference in the price that an investor is willing to pay for a liquid investment compared to an otherwise comparable illiquid investment may be material. This price difference is commonly referred to as "the DLOM valuation adjustment."

That is, the DLOM measures the difference in the expected price between:

1. a liquid asset (that is, the benchmark price measure) and
2. an otherwise comparable illiquid asset (typically, the valuation subject).

This discussion summarizes the following topics:

1. The concepts of investment liquidity and investment illiquidity
2. The various empirical and theoretical models that may be used to estimate the DLOM
3. The application of the DLOM to the valuation of a closely held taxpayer company
4. The factors that analysts consider in the DLOM selection

The Concepts of Investment Liquidity and Illiquidity

The terms marketability and liquidity are sometimes used interchangeably. However, there are differences between the two terms.

Barron's Dictionary of Business Terms defines marketability and liquidity as follows:

> Marketability. Speed and ease with which a particular security may be bought and sold. A stock that has a large amount of shares outstanding and is actively traded is highly marketable and also liquid. In common use, marketability is interchangeable with liquidity, but liquidity implies the preservation of value when a security is bought or sold.[1]

The investment attribute of marketability is not an either/or proposition. That is, there are varying degrees of investment marketability. There is a spectrum of investment marketability, ranging from fully marketable to fully nonmarketable.

An ownership interest of a publicly traded security can typically be converted into cash quickly, at low cost, and with certainty of price. This is the typical investment benchmark for a fully marketable investment.

At the other end of the marketability spectrum is the ownership of a closely held company that pays no dividends or other distributions, requires capital contributions, and limits ownership of the company to certain individuals.

Of course, there are a number of positions in between these two extremes in the investment marketability spectrum.

Typical Reasons to Apply a DLOM Valuation Adjustment

In the U.S. public capital markets, a security holder can quickly sell most publicly traded securities at or near the last public trade price. And, the public market transaction typically occurs at a very small commission cost.

By contrast, the population of potential buyers for a closely held taxpayer company is a small percentage of the population of potential buyers for publicly traded securities.

In fact, it may be illegal for an individual or an issuer to sell closely held company securities to the general public without first registering the security offering with either:

1. the Securities Exchange Commission (SEC) or
2. the state corporation commission.

Such a security offering registration is an expensive and time-consuming process.

Besides the problems associated with selling a closely held taxpayer company, it is also difficult to hypothecate the closely held company. That is, the value of the closely held taxpayer company is further affected by the unwillingness of banks and other lending institutions to accept such a company as loan collateral.

Because of these differences in the owner's ability to sell or hypothecate a closely held taxpayer company (compared to publicly traded shares), empirical evidence suggests that the DLOM valuation adjustment may be appropriate.

Baseline from Which to Apply the DLOM

In the unit valuation of the closely held taxpayer company, the analyst typically applies one or more of the three generally accepted unit valuation approaches:

1. Market approach
2. Income approach
3. Asset-based (or cost) approach

In the market approach, the generally accepted unit valuation methods include the following:

1. The stock and debt method
2. The sales comparison method
3. The backsolve method (that analyzes actual arm's-length sales of taxpayer company securities)

In the income approach, the generally accepted unit valuation methods include the following:

1. The yield capitalization method
2. The direct capitalization method

In the cost approach, the generally accepted unit valuation methods include the following:

1. The historical (or original) cost less depreciation method
2. The replacement cost new less depreciation method
3. The reproduction cost new less depreciation method

Depending on the individual valuation variables used, these three generally accepted unit valuation approaches may conclude taxpayer unit value indications on either:

1. a controlling ownership interest level of value or
2. a noncontrolling ownership interest level of value.

In the typical application of the three unit valuation approaches, the resulting value indications are often concluded on a marketable (as if traded on a public stock exchange) basis.

The amount of the DLOM depends on the facts and circumstances related to the subject closely held taxpayer company. This discussion summarizes the factors that an analyst typically considers in the DLOM measurement and selection process.

Certain engagement-specific factors may also affect the appropriate level of the DLOM. One engagement-specific factor that analysts consider is the particular level of value sought in the property tax valuation engagement.

This discussion focuses on measuring the DLOM in the context of a closely held taxpayer company unit valuation.

"[N]umerous judicial decisions have affirmed the application of a DLOM to the valuation of a closely held company controlling ownership interest."

Illiquidity of a Closely Held Taxpayer Company

Closely held company ownership interests suffer from illiquidity in somewhat the same way as noncontrolling equity interests in a closely held company. The marketability of a closely held interest—whether a 100 percent ownership or noncontrolling ownership—is determined by the ability of the owner to quickly, at low cost, and with some degree of certainty, convert the closely held company ownership to cash.

In the federal gift and estate tax arena, numerous judicial decisions have affirmed the application of a DLOM to the valuation of a closely held company controlling ownership interest.[2]

This DLOM valuation adjustment is a function of both:

1. the individual valuation methods applied and the individual valuation variables used in the unit valuation and
2. the level of value that is the objective of the property tax valuation.

The unit value of a closely held taxpayer company suffers some value decrement (compared to an otherwise comparable readily marketable security).

This DLOM valuation adjustment is due to the following two factors:

1. The absence of a ready private placement market
2. Flotation costs (which would be incurred in achieving liquidity through a public offering)

The company owner faces the following transaction risk factors when attempting to sell the closely held taxpayer company:

1. An uncertain time horizon to complete the offering or sale
2. "Make ready" accounting, legal, and other costs to prepare for and execute the offering or sale
3. Risk as to the eventual sale price
4. Uncertainty as to the form (e.g., stock or cash) of transaction sale proceeds
5. Inability to hypothecate the subject unit of operating assets
6. Investment banker or other brokerage fees

Risk factors one through five are summarized next. A summary of risk factor six—that is, investment banker or brokerage fees—is presented below in the "cost to obtain liquidity studies" discussion.

Investment Time Horizon Uncertainty

It may take months (or even years) to complete the offering or sale of the closely held taxpayer company. This uncertain (but considerable) time horizon contrasts with the principle of marketability. The principle of marketability typically implies a short ownership-interest-for-cash conversion period.

Transaction "Make Ready" Costs

As discussed below (in the "cost to obtain liquidity studies" discussion), there may be substantial costs:

1. to prepare the closely held taxpayer company for sale and
2. to execute the closely held taxpayer company offering or sale.

A study published in 2000 concluded that underwriter costs alone typically represent 7 percent of the deal size in an initial public offering (IPO).[3]

These underwriter-related transaction costs do not include the following:

1. Related auditing and accounting fees
2. Legal costs to draft documents, clear contingent liabilities, and negotiate warranties
3. Business owner administrative costs

In "The Cost of Going Public," Jay Ritter estimated these "other" transaction-related costs to be between 2.1 percent and 9.6 percent of the IPO total proceeds.[4]

Expected Taxpayer Company Sale Price Uncertainty

The seller of the closely held taxpayer company may not achieve the expected sale price because of many factors:

1. Overstatement of the business (or unit) value on which the expected sale price is based
2. Occurrence of taxpayer company-specific events during the market exposure period that cause the company sale price to decrease
3. Occurrence of market events during the market exposure period that cause the company sale price to decrease
4. Lack of receptivity by capital markets to companies in the subject taxpayer industry
5. Lack of receptivity by capital markets to the subject taxpayer company

Expected Taxpayer Company Sale Proceeds Uncertainty

If the taxpayer company sale proceeds are in a form other than cash, then the cash-equivalent transaction price may be less than the reported transaction consideration.

Examples of the taxpayer company sale proceeds components that may have a cash equivalency value below face value include the following:

1. Restricted public stock
2. Seller-provided below-market financing
3. Future contingency payments
4. Future earn-out payments

Inability to Hypothecate the Closely Held Taxpayer Company

Banks are reluctant to lend based on the pledge of a closely held taxpayer company as collateral. Accordingly, it is difficult for the closely held company owner to borrow against the expected transaction sale price.

Investment Banker or Other Brokerage Costs

One consideration in the DLOM estimation of a closely held taxpayer company is the cost to obtain liquidity studies.

These DLOM studies only apply to the analysis of a closely held taxpayer company controlling ownership interest. This is because the cost to obtain liquidity studies are based on transactions of a closely held company controlling ownership interest.

The Cost to Obtain Liquidity Studies

The evidence that the analyst sometimes considers to support the closely held taxpayer company unit value DLOM is summarized below.

Transaction Costs

The various transaction costs related to the closely held taxpayer company sale include the following:

1. Auditing and accounting fees. These fees are incurred in preparing financial statements and related information for potential buyers and/or underwriters.
2. Legal costs. These costs are incurred in preparing documents, investigating contingent liabilities, and negotiating warranties.
3. Administrative costs (i.e., opportunity costs). These costs are related to the time committed by company owners and managers to deal with accountants, lawyers, potential buyers and/or their representatives.
4. Transaction and brokerage costs. These business broker, investment banker, or other transaction intermediary costs are sometimes referred to as "flotation costs." When these transaction costs are expressed as a percentage of the sale price, the percentage cost is referred to as the "gross spread."

In a study published in 1987, Jay Ritter analyzed the flotation costs typically incurred by the security issuer in an IPO.[5] These flotation cost data are summarized in Exhibit 1.

The Ritter study indicates that larger closely held companies generally negotiate lower underwriting fees as a percent of the IPO total proceeds.

More current flotation cost information is presented in a study conducted by Jay Ritter and Hsuan-Chi Chen published in 2000.[6]

In the "Seven Percent Solution," the authors examined the price spread (i.e., the underwriter price discount) from 3,203 firm commitment IPOs from January 1985 to December 1998. The selected IPO transactions all had domestic total proceeds of at least $20 million before the exercise of the overallotment option. Exhibit 2 summarizes the results from this Ritter and Chen study.

Ritter and Chen concluded that a significant number of IPOs were completed with a total price spread of exactly 7 percent. In the 1985 to 1987 period, 23 percent of all IPOs had a 7 percent total price spread. Of the IPOs analyzed in the 1998 to 1994 period, the amount of transactions with a 7 percent price spread increased to 60 percent.

For 1995 to 1998, 77 percent of all IPOs had a total price spread of exactly 7 percent. Ritter and Chen observed that the price spread is larger for smaller companies.

This evidence indicates that a reasonable underwriter price discount for an IPO is 7 percent for companies with IPO total proceeds exceeding $20 million.

PricewaterhouseCoopers LLP (PwC) published a study on IPO costs in September 2012.[7] PwC authors Martyn Curragh, Henri Leveque, and Neil Dhar examined both the costs a company incurs to make an IPO as well as the ongoing costs a company incurs to remain a publicly traded entity.

The PwC study analyzed over 380 IPO transactions between January 1, 2009, and June 30, 2012. The PwC study examined the following costs associated with the IPO transactions:

1. Underwriter fees
2. Legal, accounting, and other fees directly attributable to the IPO

Exhibit 3 summarizes the PwC IPO cost study.

The PwC study concluded that the average cost paid to the IPO underwriter ranged from 5.5 percent of the total sale proceeds to 6.9 percent of the total sale proceeds. The PwC study suggests a trend of decreasing costs as a percentage of total IPO sale proceeds as the size of the IPO increases.

The PwC study quantified additional costs related to an IPO. It suggests that the total costs associated with an IPO, on a percentage of total proceeds, is actually greater than the 5.5 percent to 6.9 percent demanded by the underwriter.

Exhibit 1
Ritter Study
IPO Flotation Cost Analysis

IPO Total Proceeds [a] ($Million)	Number of Transactions Considered	Underwriting Price Discount [b] (%)	Other Flotation Expenses [c] (%)	Total IPO-Related Cash Expenses (%)
Firm Commitment IPO Offers				
0.1–1.999999	68	9.84	9.64	19.48
2.0–3.999999	165	9.83	7.60	17.43
4.0–5.999999	133	9.10	5.67	14.77
6.0–9.999999	122	8.03	4.31	12.34
10.0–120.174175	176	7.24	2.10	9.34
All Offers	664	8.67	5.36	14.03
"Best-Efforts" IPO Offers				
0.1–1.999999	175	10.63	9.52	20.15
2.0–3.999999	146	10.00	6.21	16.21
4.0–5.999999	23	9.86	3.71	13.57
6.0–9.999999	15	9.80	3.42	13.22
10.0–120.174175	5	8.03	2.40	10.43
All Offers	364	10.26	7.48	17.74

[a] Total proceeds categories are nominal; no price level adjustments were made.
[b] The underwriting discount is the commission paid by the issuing firm; this is listed on the front page of the firm's prospectus.
[c] The other expenses figure comprises accountable and nonaccountable fees of the underwriters; cash expenses of the issuing firm for legal, printing, and auditing fees; and other out-of-pocket costs. These other expenses are described in footnotes on the front page of the issuing firm's prospectus. None of the expense categories include the value of warrants granted to the underwriter, a practice that is common with best-efforts offers.
Source: Jay R. Ritter, "The Costs of Going Public," *Journal of Financial Economics* (January 1987): 272.

Exhibit 2
Ritter and Chen Study
Analysis of the Number of IPOs, Total Sale Proceeds, and Total Price Spread Percent

IPO Total Proceeds:	$20 Million–$80 Million			$80 Million and Up			All IPOs in the Study		
IPO Transaction Date	Below 7%	Exactly 7%	Above 7%	Below 7%	Exactly 7%	Above 7%	Below 7%	Exactly 7%	Above 7%
1985–87	46%	26%	28%	76%	12%	12%	52%	23%	25%
1988–94	14%	75%	11%	90%	10%	0%	31%	60%	9%
1995–98	5%	91%	4%	71%	28%	1%	20%	77%	3%

Exhibit 3
PwC Study
Analysis of the Number of IPOs, Total Sale Proceeds, and Costs Associated with IPOs

IPO Total Proceeds:	$20 Million–$80 Million			$80 Million and Up			All IPOs in the Study		
IPO Transaction Date	Below 7%	Exactly 7%	Above 7%	Below 7%	Exactly 7%	Above 7%	Below 7%	Exactly 7%	Above 7%
1985–87	46%	26%	28%	76%	12%	12%	52%	23%	25%
1988–94	14%	75%	11%	90%	10%	0%	31%	60%	9%
1995–98	5%	91%	4%	71%	28%	1%	20%	77%	3%

Each of the above-described cost to obtain liquidity studies concluded that larger companies can negotiate lower underwriter fees, as a percent of the IPO total sale proceeds.

The PwC study presented evidence that reasonable underwriter fees range from approximately 5 percent to 7 percent, depending on the size of the IPO. The PwC study also concluded that the additional costs associated with an IPO make the total costs, as a percentage of total sale proceeds, greater than 5 percent to 7 percent.

The Ritter and Chen study presented evidence that reasonable underwriter fees are approximately 7 percent of the IPO total sale proceeds. That study did not analyze companies with IPO total sale proceeds of less than $20 million.

The Ritter study did analyze companies with IPO total sale proceeds under $20 million, indicating costs of over 10 percent of the IPO proceeds for smaller transactions.

Also, the seller of a closely held taxpayer company may incur other costs in addition to:

1. the underwriter fees and
2. the "other costs" described above.

The above discussion presented six factors that contribute to the closely held taxpayer company DLOM valuation adjustment.

These six DLOM valuation adjustment factors relate to the following:

1. Uncertain investment time horizon risk
2. "Make ready" cost risk
3. Expected sale price risk
4. Expected sale proceeds risk
5. Inability to hypothecate the ownership interest
6. Investment banker or other brokerage fees.

Only investment banker or other brokerage fees are included in the 7 percent liquidity cost measured by Ritter and Chen, and the 5 percent to 7 percent liquidity cost measured by the PwC study. In order to measure the closely held taxpayer company DLOM, the analyst should consider all of the costs associated with the sale of the taxpayer company.

Subject Taxpayer Company Risk

Another factor that may affect the closely held company DLOM is the subject taxpayer company risk. Numerous studies conclude that the DLOM size is related to the stock price volatility (one measure for risk). Numerous studies also attribute company size (another measure for risk) with the DLOM size.

Analysts generally agree that a large closely held company is a "safer" investment than a similar small closely held company, all other factors being equal. This conclusion is illustrated by comparing the expected rates of return on large-capitalization companies to small-capitalization companies.

Ibbotson Associates makes this comparison in the *Ibbotson SBBI 2015 Classic Yearbook*:

> One of the most remarkable discoveries of modern finance is that of a relationship between company size and return. . . . The relationship between company size and return cuts across the entire size spectrum. . . . Small-cap stocks are still considered riskier investments than large-cap stocks. Investors require an additional reward, in the form of additional return, to take on the added risk of an investment in small-cap stock.[8]

"[L]arger earnings typically enable a company to (1) withstand downturns in the economy and the subject industry and (2) capitalize on growth opportunities."

Large companies are perceived as safer investments than small companies. This is because larger earnings typically enable a company to:

1. withstand downturns in the economy and the subject industry and
2. capitalize on growth opportunities.

Factors in addition to size can also affect the subject taxpayer company risk. The following list includes some of the factors that may affect the subject taxpayer company risk:

- Historical financial ratios
- Historical earnings trends/volatility
- Management depth
- Product line diversification
- Geographic diversification
- Market share
- Supplier dependence
- Customer dependence
- Deferred expenditures
- Lack of access to capital markets

Each of the above DLOM factors should be examined within the context of how they affect the closely held taxpayer company. The analyst typically considers how each factor affects the owner's ability to sell the closely held taxpayer company.

Summary and Conclusion

An analyst may be asked to value a closely held taxpayer company total "unit" of operating assets for various property taxation reasons. This is particularly true if the taxpayer is assessed based on the unit valuation principle. The unit valuation principle values all of the taxpayer's property (both real and personal, and both tangible and intangible) collectively as a single income-producing "unit" of operating assets.

Depending on (1) the unit valuation approach and valuation method applied and (2) the benchmark valuation variable data used, the analyst may conclude the unit value of the closely held taxpayer company on a marketable basis—that is, as if the company was traded on a public stock exchange.

Even if the taxpayer's parent corporation was a public corporation, the subject taxpayer property owner may be a closely held company. And, certainly, the taxpayer's operating assets are not traded on a public stock exchange.

In such an instance, the analyst may need to apply a DLOM valuation adjustment to conclude the appropriate unit value of the closely held taxpayer company.

This discussion summarized the factors that the analyst typically considers in order to measure the DLOM for the unit valuation of a closely held taxpayer company.

Notes:

1. John Downs and Jordan Elliot Goodman, eds., *Barron's Dictionary of Finance and Investment Terms*, 6th ed. (Hauppauge, NY: Barron's, 2003), 406.
2. See, for example: Estate of Dunn (T.C. Memo 2000-12), Estate of Jameson (T.C. Memo 1999-43), Estate of Dougherty (T.C. Memo 1990-274), and Estate of Maggos (T.C. Memo 2000-129).
3. Hsuan-Chi Chen and Jay Ritter, "The Seven Percent Solution," *The Journal of Finance* (June 2000): 1129.
4. Jay Ritter, "The Costs of Going Public," *Journal of Financial Economics* (January 1987): 269–281.
5. Ibid.: 272.
6. Chen and Ritter, "The Seven Percent Solution."
7. Martyn Curragh, Henri Leveque, and Neil Dhar, et al., "Considering an IPO? The Costs of Going and Being Public May Surprise You," PricewaterhouseCoopers LLP (September 2012), http://www.pwc.com/us/en/transaction-services/publications/cost-of-ipo-september-2012.jhtml (accessed December 4, 2014).
8. *Ibbotson SBBI 2015 Classic Yearbook* (Chicago: Morningstar, 2015), 99, 113.

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Tangible Personal Property Summation Valuation Procedures

Robert F. Reilly, CPA

For ad valorem property taxation purposes, industrial and commercial taxpayer tangible personal property (TPP) can be valued using either the unit valuation principle or the summation valuation principle. In theory, the use of either valuation principle should reach about the same value conclusion for the same bundle of taxpayer TPP. In the unit valuation principle, all of the taxpayer TPP is valued collectively, in the aggregate, as a single "unit" of operating property. In the summation valuation principle, all of the taxpayer TPP assets are valued individually. The values of all of the individual TPP assets are "summed" to reach the total value conclusion. This discussion summarizes the generally accepted summation valuation approaches and methods related to taxpayer TPP.

Introduction

This discussion summarizes the generally accepted summation valuation approaches and methods related to industrial and commercial taxpayer tangible personal property (TPP).

As with all TPP valuation procedures, the analyst should perform the procedures described below as thoroughly as possible. However, it is not always possible for the analyst to perform (or to complete) every procedure in every TPP summation valuation.

Often, there are client scope of work restrictions that limit the analyst's ability to perform all of the valuation procedures. Often, there are property access and data access considerations that limit the analyst's ability to perform every valuation procedure. And, the valuation variable data may simply not be available and/or the valuation procedure is simply not relevant to the particular TPP summation valuation.

In the typical TPP summation valuation, the following valuation procedures are usually performed on an individual property-by-property basis. That is, the analyst effectively performs a valuation of the total bundle of taxpayer TPP by summing the value indications for each individual TPP asset. For example, all property confirmation and property condition consideration procedures are typically performed on an individual property-by-property basis.

The first group of analyst procedures is common to all TPP summation valuations—regardless of the valuation approach used. The second group of analyst procedures will be disaggregated by each generally accepted TPP valuation approach.

General Procedure Category I: Asset Inventory and Inspection Procedures

The first category of procedures in the summation valuation of taxpayer TPP includes the following:

1. Obtain the owner/operator listing of the subject TPP assets.
2. Confirm the existence of the subject TPP assets within the confines of the taxpayer entity.
3. Consider the accuracy of the continuing property record data related to the taxpayer TPP assets.

"If there are operating TPP observed . . . that are excluded from . . . the taxpayer's continuing property record listing, then add these existing assets to the taxpayer's property listing."

4. Consider the overall condition of the taxpayer TPP.

Procedure 1: Obtain the Taxpayer Property Accounting TPP Listing

The analyst typically starts with the property owner's continuing property record regarding the taxpayer TPP. The analyst typically obtains the taxpayer's TPP listing that is prepared "as of" a date as close as possible to the valuation date.

Procedure 2: Confirm Existence of the Taxpayer's TPP

The analyst may perform the following tests of inclusion and exclusion with regard to the taxpayer's continuing property record listing.

1. Verify that a reasonable sample of the operating TPP included on the taxpayer's property list are, in fact, in existence.
2. If there are asset pieces included on the taxpayer's TPP listing that are no longer in use in the taxpayer's operations, then remove those unused assets from the continuing property record listing.
3. Verify that a reasonable sample of the TPP in use (i.e., that are physically located at the taxpayer facilities) are, in fact, included in the taxpayer's continuing property record listing.
4. If there are operating TPP observed during the tests of inclusion and exclusion that are excluded from (or not on) the taxpayer's continuing property record listing, then add these existing assets to the taxpayer's property listing.

The result of the analyst's performance of these aggregate existing data verification and TPP inclusion/exclusion test procedures should be an accurate and verifiable taxpayer continuing property record listing.

Procedure 3: Consider the Accuracy of the Continuing Property Record Data Related to the TPP

The data on the taxpayer's continuing property record listing may be verified through discussions with operations, maintenance, engineering, or plant accounting disciplines.

The analyst may request assurances or representations from the taxpayer operations or accounting management with regard to the following types of continuing property records data:

1. The continuing property record operating TPP listing number
2. Taxpayer TPP identification number or bar code
3. The TPP asset manufacturer and country of origin
4. The general category of the TPP
5. The specific type of the TPP
6. The model number of the TPP
7. The serial number of the TPP
8. The date of manufacture of the TPP
9. The location of the TPP including building address, room number, department number, etc.
10. The capacity of the TPP against model specifications
11. Any internal upgrades or enhancements to the TPP against model standards
12. Any appurtenances and other external peripherals attached to the TPP
13. Appurtenances that have been identified and noted separately in the continuing property record listing
14. The last plant TPP physical inventory date
15. The date that the TPP was put into service

Procedure 4: Consider the Average Condition of the Property within Each TPP Category

The analyst may consider the condition, maintenance, and operating environment of the taxpayer TPP through discussions with operations, maintenance, engineering, or accounting representatives.

In such discussions with taxpayer management, the analyst may consider the following property

condition factors (on either a TPP-specific basis or a TPP category-by-category basis):

1. The condition of the TPP, including consideration of physical deterioration, wear and tear, and so forth
2. The adequacy of the taxpayer property operating environment
3. The usage of the typical bundle of taxpayer TPP including:
   a. percent of time per period of continuous use and
   b. number of operators using the TPP during a given period
4. The existence of any maintenance agreement for the TPP and the maintenance logs for the TPP, including consideration of:
   a. the number of operator complaints,
   b. the severity of operator complaints,
   c. how operator complaints are rectified, and
   d. the existence of any recurring TPP operations problems

Category II: Operating TPP Data Collection and Analysis

The taxpayer's continuing property record listing may contain certain information such as the original cost of the TPP within the taxpayer, the date each asset was placed into service, and the accumulated financial accounting depreciation related to each TPP asset.

The first two procedures in this category are common to all TPP summation valuation methods.

Procedure 1: Discuss the Type of Data Included in the Continuing Property Record Listing with Management

The analyst may discuss with the taxpayer operations or accounting management the accuracy of the continuing property records data, including the following data considerations:

1. The original cost of the TPP with respect to an actual purchase order
2. The original cost of the TPP with respect to the paid invoice amount
3. The purchase order date
4. The invoice date
5. The date when each TPP asset was received at the taxpayer facility
6. The date when each TPP asset was placed into service
7. Any sales tax that was included on the paid invoice
8. Any freight, insurance, or other delivery expenses that was included on the paid invoice

Procedure 2: Discuss the Type of Historical Cost Information that Is Captured in the Continuing Property Record with Management

The analyst may discuss with the taxpayer operating, purchasing, maintenance, or accounting management the type of cost data that are included in the property record. These data may include consideration of the following cost components:

1. Installation Costs. Set-up costs on the basis of the normal amount of time required for various set-up activities including (a) unpacking and checking and (b) making necessary power, gas, water, and other internal and/or external connections.
2. Special requirements expenditures. Expenditures required specifically for the TPP to work efficiently, such as high power source wiring, dust-free air equipment, special installation, and the like.
3. Commissioning expenses. Start-up expenses related to the normal amount of time required for various start-up activities including, for example, loading necessary systems and applications software, process debugging, and hand-over to the property operator.

Procedure 3: Collect the Data Necessary to Perform the Selected Valuation Analyses

The analyst typically considers these data collection procedures with respect to each selected TPP summation valuation method.

Data Related to the Cost Approach Replacement Cost New less Depreciation Method

For each category of TPP assets in the taxpayer's continuing property record listing, the analyst may research the appropriate price, production, and cost indexes. Common sources of such indexes include the *Statistical Abstracts of the United States*, the *Marshall & Swift Valuation Guide*, and others.

An index—for price, cost, materials, wages, production, and so on—is simply a calculation for reporting the relative changes in the price or cost of specific items—or groups of items—over a period of time.

Data Related to the Sales Comparison Approach Direct Sales Comparison Method

For the taxpayer's bundle of TPP assets, the analyst may research transaction pricing data with regard to actual sales of guideline bundles of seasoned assets.

Guideline TPP operating assets generally have these same characteristics:

1. Manufacturers and countries of origin
2. General categories of TPP assets
3. General types of TPP assets
4. Number of TPP assets
5. Average dates of manufacture (or average age) of the TPP assets

If sales data related to sufficiently comparative TPP assets are not available, then the analyst may reconsider the applicability of the sales comparison approach with respect to the TPP valuation.

If there are actual sales of sufficiently comparative TPP assets, then the analyst may investigate and confirm the following information with regard to each guideline transaction:

1. The actual market price for each guideline sale transaction
2. The time (month and year) of each guideline transaction
3. The location of the sale transaction
4. The average condition of the guideline TPP assets
5. Any upgrade or changes from the standard specifications of the typical TPP assets within the guideline unit
6. Any unrelated property (e.g., nonoperating assets, nontaxable assets) included/excluded in the guideline sale transaction
7. Any special terms and conditions of the guideline transaction

The analyst's search for guideline sale transactions may be conducted by:

1. researching publicly available industry or competitor company data,
2. licensing/renting/buying privately developed transaction databases, and
3. gathering information from reputable and knowledgeable TPP equipment brokers.

Data Related to the Income Approach Yield Capitalization Method

For the taxpayer's bundle of operating TPP, the analyst may research transactional data with regard to the actual rental or lease of guideline TPP assets. If guideline rental transaction data are not available, then the analyst may want to reconsider the applicability of the yield capitalization method in the TPP summation valuation.

For each rental or lease of guideline assets, the analyst may consider the terms and conditions of the rental/lease agreement, including the following:

1. The term of the leas agreement
2. The amount of rent payable for each period of the term
3. The inclusion of any penalty clause, with the amount of the penalty
4. The inclusion of any asset purchase clause, with the contractual purchase price.

For each guideline rental transaction, the analyst may consider the following data:

1. The rental history regarding the guideline TPP assets
2. The maintenance history including maintenance expense regarding the guideline TPP assets
3. The guideline TPP assets' general and administrative expense
4. The guideline TPP assets' marketing and advertising expense

Also, the analyst may consider the following capital market and economic factors in the derivation of the appropriate yield capitalization rate:

1. The prevailing risk-free rate of return
2. The amount of any additional TPP-specific risk premium
3. The expected long-term inflation rate

Analysis Related to the Cost Approach Replacement Cost New less Depreciation Method

Using a cost, price, or production index for the industry, the analyst may use cost "inflation" trending factors for each taxpayer vintage group of TPP. The cost new for each operating TPP vintage group is estimated by multiplying (1) the historical cost of the taxpayer TPP within the vintage group by (2) the appropriate age-dependent cost trending factor.

Next, the analyst may estimate the average age of each property category within the taxpayer entity. The analyst may estimate the average RUL of the subject TPP based on:

1. property-specific statistical studies or
2. published information regarding the effective life of property in the taxpayer industry.

Using this RUL estimate as a proxy, the analyst may estimate the "percent good" for the subject TPP. This percent-good factor takes into account the normal physical depreciation of the subject TPP.

For the analyst's observations regarding the condition, maintenance, and operations of the subject TPP, the costs and expenses that would be required to bring the existing TPP to state-of-the-art condition—or the costs required to operate the taxpayer with below state-of-the-art TPP—are estimated. This factor is one consideration for measuring any functional obsolescence.

Analysis Related to the Sales Comparison Approach Direct Sales Comparison Method

Adjustments to the transactional sale price may be made for any changes from the specifications and information regarding the taxpayer TPP.

The analyst may study the selected sales of guideline TPP assets in order to adjust each guideline sale transaction price for the following differences between the taxpayer TPP and the guideline sale TPP assets:

1. The average year of manufacture installation (i.e., the average age of the TPP assets)

2. The types of manufacturers and the TPP specifications
3. The time of each actual sale and the valuation date
4. The location of each actual sale and the location of the taxpayer TPP assets
5. The average condition of the guideline assets relative to the condition of the taxpayer TPP assets
6. Any additions and/or deletions to the average specifications of the guideline TPP assets and the average specifications of the taxpayer TPP assets
7. Any special terms and conditions of the guideline sale transactions in order to reflect the sale of a fee-simple interest

The analyst may conclude an adjusted sale price for each sale of guideline TPP assets giving due consideration to the adjustment factors listed above.

Analysis Related to the Income Approach Yield Capitalization Method

The analyst may estimate the market-derived normalized—or stabilized—annual rental income related to the taxpayer TPP. The analyst may also estimate the maintenance, marketing, and other administrative expenses related to the taxpayer TPP.

The analyst may project the net operating income associated with an actual or hypothetical rental related to the taxpayer TPP. Next, the analyst may then project the average RUL of the taxpayer TPP.

Finally, the analyst may develop present value discount factors from the selected present value discount rate. The present value discount rate is based on the analyst's consideration of the asset-specific risk factors associated with the taxpayer TPP.

Category III: Valuation Synthesis and Conclusion

The analyst may develop a value indication from each applicable TPP summation valuation approach and method.

The analyst may then reconcile the various value indications and synthesize a final value conclusion related to the taxpayer TPP.

Value Indication for the Cost Approach Reproduction Cost New less Depreciation Method

A value indication for the taxpayer TPP may be developed based on the following procedures:

	Historical cost
×	Trend factor
=	Reproduction cost new
–	Physical depreciation
=	Reproduction cost new less depreciation
–	Functional obsolescence
–	External obsolescence
=	TPP value indication

Value Indication for the Income Approach Yield Capitalization Method

A value indication of the taxpayer TPP may be developed based on the following procedures:

	Normalized income
×	Corresponding present value discount factor
=	Discounted income
	Sum of discounted income
÷	Average RUL of the taxpayer TPP
=	TPP value indication

Valuation Synthesis and Conclusion

If more than one summation valuation approach is applicable, then the analyst should give appropriate weight to the various value indications in order to conclude a final taxpayer TPP value conclusion.

The appropriate weight assigned to each summation value indication should be based on the following:

1. Quantity and quality of data analyzed in each applicable summation valuation method
2. The analyst's confidence in the developed valuation variables and operating/financial projections
3. The analyst's personal experience with the taxpayer industry

The analyst typically assigns appropriate weights to the various value indications in order to calculate a final value estimate. This final value estimate is then rounded in order to conclude the summation value of the taxpayer TPP.

Summary

The above discussion summarized several issues with regard to the summation valuation of taxpayer TPP for ad valorem property tax purposes. Generally accepted summation valuation approaches, methods, and procedures were introduced. The above discussion summarized the application of the generally accepted approaches, methods, and procedures to the typical summation valuation of taxpayer TPP.

Within each summation valuation approach, several valuation methods were discussed. And, within each summation valuation method, individual TPP valuation procedures were described.

The first group of procedures described was general to all TPP valuation approaches. The second group of procedures described was specific to the indicated TPP valuation approach.

This is the typical process that analysts perform in the summation valuation of taxpayer TPP. After all of the summation valuation approaches and methods are performed, the analyst reconciles the various value indications into a total taxpayer TPP value conclusion.

This total TPP value conclusion is a function of the quantity and quality of available data, the experience and judgment of the analyst, the purpose and objective of the TPP valuation, the appropriate standard (or definition) of value, and the appropriate premise of value.

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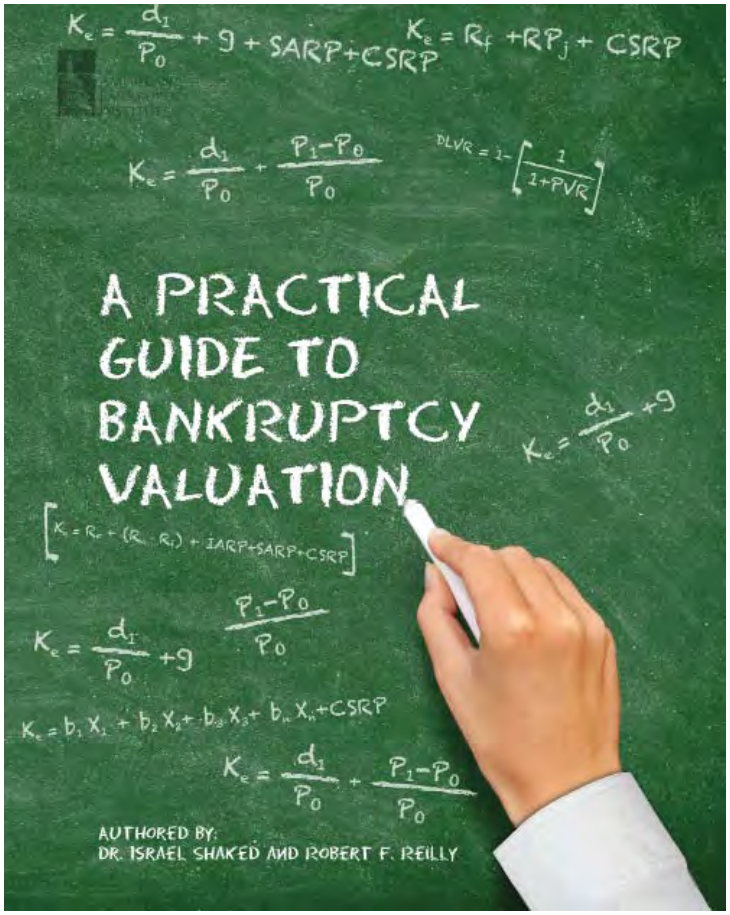

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A PRACTICAL GUIDE TO BANKRUPTCY VALUATION

Dr. Israel Shaked and Robert F. Reilly

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Willamette Management Associates

Property Tax Appeals and Valuation Principles

Daniel J. Finnegan, Esq., and Michael D. Roundy, Esq.

Many procedures and legal standards for the appeal of property taxes are similar in most jurisdictions. However, local variations in rules, procedures, or the law can lead to a series of potential traps for the unwary. This discussion will provide an overview of the property tax appeal process from a legal perspective, with a focus on jurisdictions in New England. This discussion (1) covers the basics of procedure and jurisdiction for commencing a tax appeal, or for further appeal of an unfavorable decision; (2) addresses the legal standards to be applied in evaluating such appeals or estimating value; and (3) summarizes specific potential traps in each jurisdiction with illustrations of the types of issues taxpayers may face that could require specialized knowledge of the local property tax laws.

Introduction

The appeal of a disputed property tax assessment ordinarily begins with an abatement request process. A failure to adhere to procedural requirements early in the process can be fatal to the taxpayer's ability to maintain an appeal.

Property Tax Appeal Procedures

For instance, in Massachusetts, a request for abatement must be submitted to the assessor's office on or before the due date for payment of the first installment of the actual tax bill. A taxpayer who fails to timely file the abatement application has lost the right to an abatement. The requirement to timely file may not be waived by the assessors and the Massachusetts Appellate Tax Board has no jurisdiction to hear a case if the abatement application was not timely filed.

The request for abatement must be submitted on an approved form. The assessors then have three months to review the request for abatement and issue their decision.

If the abatement request is denied, the taxpayer then has the option of filing an appeal of the denial. If the abatement request is not acted upon by the assessors within three months of filing, the application is "deemed denied" and the taxpayer may take the appeal.

An appeal in Massachusetts is to the Appellate Tax Board (ATB), and it must be filed within three months of the assessor's decision on the abatement request or within three months of the request being deemed denied.

The ATB is a quasi-judicial administrative body that hears and decides tax appeals. Appeals may be either formal or informal. To be entitled to discovery, a right of appeal, and written findings and report of the ATB's decision, the formal process should be used.

The rules of the ATB allow for obtaining written discovery, including interrogatories and document requests, and the exchange of expert reports which are usually prepared by appraisers. Depositions may only be taken with leave of the ATB.

The rules of evidence are generally applicable. The practice and procedure before the ATB conforms to that for equity cases in the state courts, but the ATB also has the right "to make hearings and proceedings as informal as possible, to the end that substance and not form shall govern, and that a final determination . . . may be promptly reached."[1]

This approach to evidentiary issues is typical of that found in many jurisdictions. For example, in Connecticut, hearings are informal and there are no rules of evidence. In Maine, evidence may be given in unsworn statements under some circumstances.

Also, in Maine, the Board of Tax Appeals need not observe the rules of evidence, yet the rules applicable to attorney-client privilege and work product are adhered to.

The underlying goal in most appeals is to establish the fair market value of the property in order to determine whether the property has been overvalued by the assessor. Although this goal—or standard of value—may be discussed using alternative terms, such as "fair cash value" or "market price," the ultimate meanings of these terms are largely, if not entirely, synonymous.

In Connecticut, for example, "[t]he terms actual valuation, actual value, market value, fair market value, market price and fair value are synonymous in the determination of the valuation of property for assessment purposes, but the term 'fair value' is the preferable one."[2]

In Massachusetts, the ATB is charged with determining the "fair cash valuation" of the property, which is taken to be synonymous with "fair market value" for ad valorem purposes.[3]

The language used to define fair market value may vary from one jurisdiction to another. However, the meaning of the term is generally consistent with the price an owner willing but not under compulsion to sell would receive from a buyer willing but not under compulsion to buy.

Fair market value is ordinarily estimated using generally accepted unit valuation methods and generally accepted real estate appraisal methods. This process includes consideration of the three generally accepted property valuation approaches: the cost approach, the comparable sales approach, and the income approach. "As a rule, however, [n]o one method is controlling; consideration should be given to them all, if they have been utilized, in arriving at the value of the property."[4]

Using the cost approach, the analyst may determine either a replacement cost new less depreciation or a reproduction cost new less depreciation. The reproduction cost examines the cost to produce an exact replica of the existing property.

Alternatively, replacement cost seeks to measure the cost of a property capable of the same function using current technology, even if not resulting in an exact replica of the property at issue.

For example, a replacement cost estimate for a system of gas utility property built a hundred years ago using cast iron piping may seek to price out a system capable of the same function of delivering and distributing gas using plastic pipes rather than cast iron.

The comparable sales approach is familiar to most home owners. It seeks to estimate the price at which comparable properties were sold, which serves as a basis for valuing the subject property. For this to be a viable valuation method, there must be an active market in such properties, and any differences between them must be amenable to mathematical adjustments by the appraiser.

The income approach is particularly applicable to income-generating properties. This is because an investor, concerned only with the expected return on investment, would not be willing to pay any more for the subject property than the value of the income it can be expected to generate.

A property that generates a consistent stream of income with consistent expenses can generally be valued using a direct capitalization method. In the direct capitalization method, a capitalization rate (or an income multiplier) is applied to a single year's income.

A property with a variable income stream or varying expenses from year to year may be better valued using a discounted cash flow method. That method estimates cash flow for each year of a discrete projection period, discounts the cash flow to present value, and adds a reversionary value.

Depending on the characteristics of the property, it is likely that one or two valuation methods may be more reliable to estimate the fair market value of the subject property.

The analyst should consider all viable methods of valuation and then reconcile them to a final conclusion of value. This reconciliation is based upon the analyst's judgment about the relative reliability of the various valuation methods.

Although the value of property in a tax appeal is generally the subject of valuation analyst testimony, it is typical that the appellate body is not constrained to accept or reject the specific opinions of any analyst.

Rather, in the quest for fair market value, the appellate board is typically permitted to accept or reject whichever parts of the expert testimony it finds credible (or not). The appellate board may arrive at its own determination of value, which may not agree with the opinions of either the municipality experts or the taxpayer experts.

For example, in Massachusetts, the ATB "is not required to adopt any particular method of valuation," and if the Board has "objectively adequate reasons" for disregarding an opinion of value offered into evidence, the Board's decision will be upheld on appeal."[5]

In Connecticut, "[t]he trier of fact must arrive at his own conclusions as to the value of [the taxpayer's property] by weighing the opinion of the

appraisers, the claims of the parties in light of all the circumstances in evidence bearing on value, and his own general knowledge of the elements going to establish value."[6]

In a jurisdiction where assessments are based on a fraction (or multiple) of market value, the appellate body may be concerned with whether the taxpayer's adjusted assessment exceeds market value, rather than whether the assessment itself exceeds market value.

For example, in New Hampshire, the Board of Tax and Land Appeals will focus on whether the "equalized assessment" exceeds the property's fair market value. The equalized assessment is the dollar amount of the assessment divided by the applicable equalization ratio, which is available from the municipality.

Therefore, for an assessment of $120,000 with an equalization ratio of 1.20, the focus of the Board would be whether the property was worth $100,000 on the assessment date ($120,000 / 1.2 = $100,000).

The taxpayer will ordinarily have the burden of proof in a property tax appeal. The burden in Massachusetts to show overvaluation may be accomplished in two ways:

1. By demonstrating flaws or errors in the assessor's methods of valuation
2. By introducing its own affirmative evidence of value, which undermines the assessor's valuation.[7]

In Vermont, the taxpayer must demonstrate that the "equalized" fair market value is below the assessment. This is a two-step process, in which the fair market value of the property is first estimated; then the ratio of the listed (assessed) value to fair market value is compared to the ratio for corresponding properties in the town.

This process recognizes that it is not feasible for a town to list all property at precisely its fair market value, every year, particularly where the market is changing.[8]

In Connecticut, the taxpayer has the burden to show that the property was over-assessed. There is no judicial presumption that the assessor's valuation is valid.[9] In contrast, in other jurisdictions, the taxpayer has an initial burden to overcome a presumption of validity of the assessment.[10]

If the taxpayer is dissatisfied with the decision of the initial appellate body, such decisions are usually subject to further appellate review. However, review of such decisions may be limited to questions of law or be subject to a standard that requires showing the initial decision was "clearly erroneous" in light of the evidence in the record.

Survey of New England Jurisdictions

The following survey of the procedures and standards applied in various New England jurisdictions will provide the reader a sense of the types of variation that can be expected. The laws of each jurisdiction are unique.

And, taxpayers are well advised to seek legal counsel in order to properly navigate the rules, timing requirements, and legal standards of the applicable jurisdiction.

Connecticut

Initial appeal of an assessment in Connecticut is made in writing to a Board of Assessment Appeals (BAA), and must be filed on or before February 20 in the year following the assessment.

Hearings before a BAA are informal, and the rules of evidence do not apply. To appeal action taken by the BAA, the taxpayer must file an appeal with the Tax and Administrative Appeals Session of the Superior Court within two months of the date of mailing of the notice of action by the BAA.

The court will review the appeal de novo, without regard to the evidence presented (or not presented) to the BAA. The trier of fact will determine the value of the taxpayer's property by weighing all the evidence in light of all the circumstances.

Therefore, the trier of fact will consider the opinions of the appraisers, all of the facts or circumstances bearing on value, and his or her own general knowledge of the elements that establish value.

The taxpayer's burden, stated in various ways, is to establish that the value of his property is less than what the assessor set it at—that is, that the assessed value is "unjust" or "overvalued" or "excessive." Only after such a showing has been made may the court grant the relief that "justice and equity" require.

Decisions of the Tax and Administrative Appeals Session may be appealed. However, the appellate courts will apply a deferential "clearly erroneous" standard on the factual question of overvaluation. Therefore, the lower court's decision will only be overturned if there is no evidence in the record to support the decision.

There are a couple possible traps for the unwary to be conscious of in Connecticut. First, if the BAA does adjust the assessment, the same adjustment will be applied in all future years until the next revaluation, and the taxpayer is not entitled to appeals in those subsequent years.

Accordingly, a small victory in one year could preclude larger adjustments on appeal in subsequent years, until a revaluation occurs.

Second, the taxpayer in Connecticut may have the option to withhold as much as 25 percent of the assessed value while appealing. However, if the taxpayer does not prevail, interest on the balance accrues at 18 percent per annum.

Finally, it is possible that the parties (assessor and taxpayer) may agree that only the value of a portion of the property is in dispute. However, this stipulation does not bind the court's ultimate determination of the value of the taxpayer's entire property.

Maine

In Maine, the state Constitution requires that property be valued at "just value," which is generally considered to be synonymous with fair market value. Assessments are based upon a ratio (percentage) of just value, and that ratio is reported to the state.

If the taxpayer believes the assessment of its property is excessive, an abatement may be applied for within 185 days of the tax being committed to the tax collector (shortly before bills are sent out).

If the abatement is denied, the taxpayer may appeal to the county commissioners within 60 days, or to the Superior Court within 30 days of the denial.

An abatement application is "deemed" denied if it is not acted upon within 60 days. If the municipality has adopted a local board of assessment review (LBAR), the appeal is to the LBAR. Further appeal to the Superior Court of the LBAR decision may be taken within 30 days.

The standard applied in evaluating the assessment is whether it "is accurate within reasonable limits of practicality." The assessment and assessor's judgment are presumed valid. Therefore, to overcome that presumption, it falls to the taxpayer to prove (absent a fraudulent or illegal assessment or unwarranted discrimination) that the assessor's judgment was so irrational or unreasonable that it resulted in the property being substantially overvalued.

This procedure requires a two-part showing. First, the taxpayer must present credible evidence to impeach the validity of the assessment itself.

Second, the taxpayer must also prove the actual fair market value of the property with credible evidence. An abatement is warranted only if the taxpayer satisfies both of these burdens.

Because mass valuation is recognized to be an inexact science, assessments will be deemed valid if they are accurate within reasonable limits of practicality. Accordingly, values that fall within 10 percent of the town's assessment ratio will likely not result in an abatement.

Massachusetts

In Massachusetts the taxpayer must timely pay the actual tax assessed on real property in order to maintain an appeal. The taxpayer may withhold a portion of the assessed taxes on personal property. However, if the taxpayer does not prevail, interest accrues at the rate of 14 percent.

Conversely, if the tax is paid and the taxpayer does prevail, it is only entitled to recover interest from the municipality at the rate of 8 percent on the overpayment.

As with many jurisdictions, Massachusetts enforces certain procedural and timing requirements by depriving the ATB of jurisdiction over the appeal if those requirements are not met. Therefore, taxpayers must be careful to comply with all procedural and timing requirements for requesting abatement and filing the appeal.

New Hampshire

In New Hampshire, the key filing dates for most tax appeals are established by specified dates, rather than measured periods of time. Therefore, an abatement application in most cases should be filed by March 1st of the year following the assessment.

Until a decision is issued, no further appeal is permitted, unless a decision has still not been issued by July 1st. Once an abatement is denied (or, in essence, deemed denied), the taxpayer may choose to file an appeal either with the Board of Tax and Land Appeals, or with the Superior Court. The appeal must be filed by September 1st.

For an appeal to succeed, the taxpayer must prove that the assessment resulted in an "unfair, illegal or disproportionate share of taxes" being paid by that taxpayer. A particular issue may be the impact of a decision in favor of abatements.

While one tax year's assessment is pending appeal, the taxpayer is not required to file appeals in subsequent years in order to obtain the benefit of abatement.

If the Board or Court orders an abatement, the same abatement order will apply to subsequent years.

However, the assessor is permitted to make good faith adjustments to each subsequent year's assessment, and the taxpayer has only a limited ability to challenge those adjustments. Appealing each year's assessment may be a better course, to preserve the right to challenge each assessment.

In New Hampshire, the taxpayer must pay the total tax due, even if applying for an abatement or appealing a denial of abatement. Failure to pay the full tax on time could result in being charged 12 percent annual interest, even if an abatement eventually is granted, and other adverse consequences.

If the tax is paid, and the taxpayer is eventually granted an abatement, then the municipality will have to refund the tax—as well as 6 percent annual interest on the overpayment.

Rhode Island

In Rhode Island, an important preliminary step to preserve all of a taxpayer's rights to appeal the assessment is the filing of a Notice of Intention to File an Account (the "Account"). This procedural step, not seen in other New England jurisdictions, requires that the taxpayer actually file the Account with the local assessor's office in March.

The taxpayer may then file an Application for Appeal with the local assessment office within 90 days of the date the tax is due (usually in September of the year following assessment, but it can vary). A property valuation or other evidence of value is typically required at this stage.

If the local assessor denies the appeal (or if there is no decision within 45 days), the taxpayer has 30 days to appeal further to a local tax appeal board.

An adverse decision by the tax appeal board may be appealed in the Superior Court by filing a petition for relief from the assessment within 30 days. The accounts and appeals for each subsequent year must be filed by the taxpayer until the case is resolved.

To avoid losing appeal rights, and being charged interest, the taxpayer must pay the tax in full. In addition, the filing of a true and full Account is mandatory, and failure to do so "eliminates the right of appeal."

Vermont

In Vermont, local elected officials known as "listers" serve the function of the assessors, and value the property for inclusion in a "grand list" of the property in the municipality. After an initial list is lodged and notices are sent, taxpayers must file a grievance to contest the listed value of their property.

This grievance consists of a written notice of appeal filed with the board of listers. The various deadlines vary depending upon the population of the municipality. An open, public meeting is then held to hear all grievances filed.

Results of the grievance process are sent by registered or certified mail, and any appeal of this decision must be taken within 14 days by filing a written appeal with the town clerk.

This appeal is to the Board of Civil Authority (BCA). The BCA consists of the town clerk, justices of the peace, select board members, the mayor, alderboard, and/or village trustees (as the case may be) of each town, charged with hearing tax appeals and with overseeing election issues.

The BCA will hold a hearing that is recorded and will receive testimony under oath concerning the appeal, but in a manner less formal than a court.

Following the hearing, at least three members of the BCA must (1) inspect the property and (2) submit a written report back to the BCA within 30 days.

The BCA will issue its written decision, with findings, within 15 days of receiving the inspection report. Further appeals may follow one of two courses:

1. An appeal to the state appraiser
2. An appeal in the Superior Court

Further appeal from those bodies may be had to the Vermont Supreme Court.

Conclusion

Regardless of the terminology used in varying jurisdictions, most taxpayers are familiar with the concept that their property is supposed to be assessed at its fair market value (or equivalent standard of value).

However, most taxpayers are not familiar with the myriad of procedural rules that govern a challenge to an assessment. Making matters worse, the time frames associated with various steps the taxpayer must take to preserve a challenge are often very limited.

Given that a misstep can be fatal to the appeal of an assessment, it is advisable for the taxpayer to consult with counsel early on in the process.

Notes:

1. ATB Rules, § 1.37.
2. Bridgeport Gas Co. v. Town of Stratford, 153 Conn. 333, 335 (1966).
3. Boston Gas Co. v. Board of Assessors of Boston, 458 Mass. 715, 717 (2011).
4. Uniroyal, Inc. v. Board of Tax Review, 174 Conn. 380, 385-386, 384 A.2d 734 (1978).
5. Pepsi-Cola Bottling Co. v. Board of Assessors of Boston, 397 Mass. 447, 449-450 (1986).
6. Ireland v. Town of Wethersfield, 242 Conn. 550, 556- 557 (1997).
7. General Electric Co. v. Assessors of Lynn, 393 Mass. 591, 600 (1989).
8. Dewey v. Town of Waitsfield, 184 Vt. 92 (2008).
9. National Amusements, Inc. v. Town of East Windsor, 84 Conn. App. 473 (2004).
10. Shaffer v. Town of Waitsfield, 183 Vt. 428 (2008).

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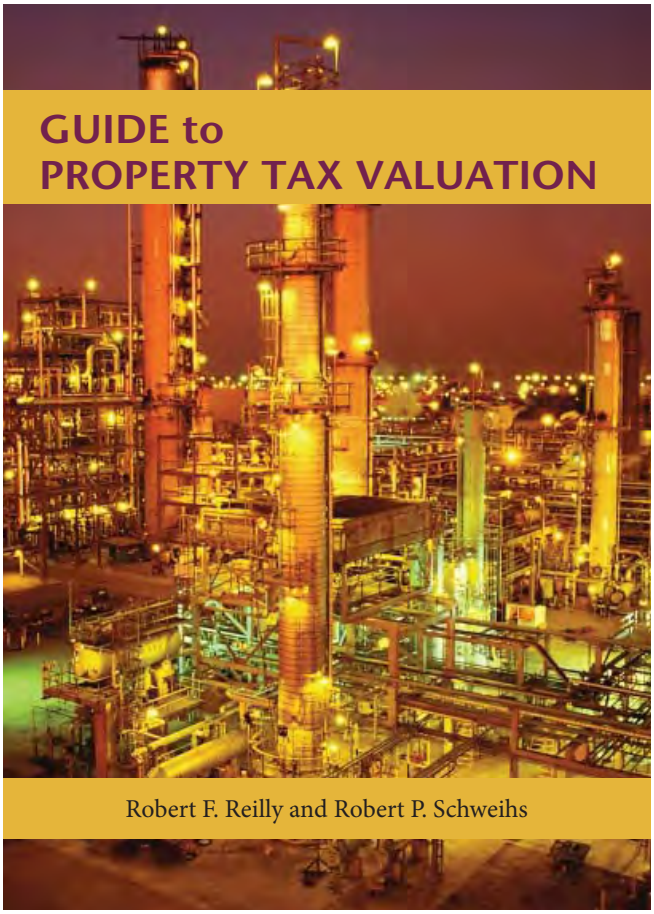

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Dark Store Theory—How to Stop It from Coming to a State Near You!

Judy S. Engel, Esq., and Lynn S. Linné, Esq

Most ad valorem property tax systems value real property in the fee simple. This means that the property is valued by assuming absolute ownership, unencumbered by any other interest or estate. It also requires that the property be valued based on market value. In the case of big-box retail, however, many assessors are advocating for a new "Dark Store Theory" that would effectively value big-box retail in the leased fee rather than in the fee simple. In other words, proponents of the Dark Store Theory attempt to value big-box retail properties based on the value the property has to the current user ("value-in-use") instead of the value the property has on the open market ("value-in-exchange"). This generally leads to increased assessed values and, in turn, increased tax revenue. The issue is whether assessing a property based on its value to the current user, as opposed to its value to the market, violates the uniformity of taxation requirement of most state constitutions.

Introduction

Under most ad valorem property tax systems, real property is valued in the fee simple, according to generally accepted real estate appraisal practices. This means that the property is valued assuming absolute ownership unencumbered by any other interest or estate, such as a lease or mortgage, and this requires that the property be valued based on its market value, or its "value-in-exchange."

In the case of big-box retail properties, however, many state and local property tax assessors ("assessors") have begun to advance a new theory known as the "Dark Store Theory."

The Dark Store Theory argues that sales of vacant big-box retail properties may not be used as comparables to value big-box retail properties that are currently in operation.

By prohibiting the use of vacant comparable sales, assessors are attempting to shift the valuation methodology from a method focused on the required fee simple value-in-exchange to a method focused on the actual "value-in-use." Big-box retail properties, however, are often subject to long-term above-market rate leases.

Therefore, the attempt to value these properties based on their value-in-use inevitably leads to a leased fee valuation, rather than a fee simple valuation, which frequently results in higher assessed values.

This discussion explores how and why the concept of the Dark Store Theory developed and the prospects for its future application to property tax assessments of big box retail properties.

Valuing the Fee Simple Interest

Most states levy ad valorem property taxes based on the assessed value of the fee simple estate. The *Dictionary of Appraisal of Real Estate* defines fee simple as "Absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, eminent domain, police power, and escheat."[1]

A number of recent judicial decisions from various states focus on accepted real estate appraisal methodology in valuing the fee simple estate of big-box retail properties.

For example, in *Kohl's Indiana L.P. v. Howard County Assessor*, the Indiana Board of Tax Review (the "Indiana Board") issued a decision relating to the assessed valuation of an 88,000 square-foot Kohl's department store.[2]

In its decision, the Indiana Board held that when selecting sales comparables, the "property should be measured against properties with a *comparable* use, as opposed to properties with *identical* users."[3]

The Indiana Board then found that "sales of vacant big boxes used for generally similar retail purposes both pre- and post-sale, if otherwise comparable and properly adjusted, may be employed in determining true tax value."[4]

The Michigan Tax Tribunal (the "Tribunal") also issued several recent decisions pertaining to the valuation of big-box retail stores. In *Ikea Property Inc. v. Township of Canton*, the Tribunal rejected the use of a sale, in part, because it was a "leased fee sale."[5]

Many of the comparable sales relied upon by the Tribunal were sales of vacant big-box properties formerly occupied by big-box retail stores.[6]

The following year, in *Kohl's Department Stores, Inc. v. Township of Frenchtown*, the Tribunal again rejected the consideration of built-to-suit leases and sale lease-backs to value property in the fee simple.[7]

The Tribunal explained that a "built-to-suit lease is simply not representative of the amount for which the real property would sell if it were vacant and available to be leased."[8]

The Tribunal continued:

> In applying a market approach, the appraiser should find sales of second-generation uses of these properties . . . If these sales are not distress sales and share the same highest and best use as the subject if vacant and available to be leased, then they will provide credible evidence of the subject's market value.[9]

The Tribunal also issued a decision in *Kohl's Department Stores, Inc. v. Township of Kochville* on the same day, in which it distinguished between the two concepts of value-in-use and market value.[10]

The Tribunal stated: "a property that has been custom built for the current occupant will usually have a value-in-use that is higher than the property's market value, as value-in-use is a function of the current use, regardless of the property's highest and best use."[11]

The Michigan Court of Appeals agreed with the Tribunal's acceptance of vacant big-box properties as sales comparables. In *Lowe's Home Centers, Inc. v. City of Grandville*, the Michigan Court of Appeals emphasized that fee simple valuation requires property to be valued as vacant and available, holding, in relevant part, that it is improper to consider:

1. customer sales receipts because "vacant and available properties do not generate customer sales receipts" or
2. whether "an owner actually intends to sell the property being valued"[12]

In a companion case, *Lowe's Home Centers, Inc. v. Township of Marquette*, the Michigan Court of Appeals held that a proper fee simple analysis of two big-box stores owned by Lowe's and Home Depot, respectively, required the subject properties to be valued as "vacant and available for sale, as opposed to occupied."[13]

Valuing the properties as a Lowe's and Home Depot store, rather than as a vacant big-box retail store, "confuse[s] the distinct concepts of fair market value (i.e., value-in-exchange) and value to the owner (i.e., value-in-use) by treating them as one in the same."[14]

The distinction between value-in-use and value-in exchange as it relates to the concept of fee simple also arose in other jurisdictions, including New York, Wisconsin, and Kansas.

In *Matter of Home Depot U.S.A. Inc. v. Assessor of the Town of Queensbury*, the New York Supreme Court, Appellate Division, affirmed the lower court's acceptance of seven vacant big-box stores in the sales comparison approach and the rejection of several built-to-suit leases in the income approach.[15]

In *Walgreens Company v. City of Madison*, the Supreme Court of Wisconsin (the "Court") found that the circuit court erred in accepting sale-leaseback and built-to-suit sale transactions and leased-fee comparables because they do not reflect "market rates."[16]

The Court concluded that "tax assessors must refrain from including creative financing arrangements under a specific property's lease in their valuations of that property."[17]

Similarly, the Kansas Board of Tax Appeals (the "Kansas Board") concluded in *In re Equalization Appeal of Prieb Properties, L.L.C.*, that "built-to-suit leases are financing arrangements for new construction and generally do not provide a reliable

indication of value for big box facilities that are resold on the secondary market."[18]

Accordingly, the Kansas Board determined that in order to "distill the value of the fee simple estate," built-to-suit leases and sales must be ignored.

The Origin of "Dark Store Theory"

Although many courts emphasized that generally accepted appraisal methodology is permitted, if not encouraged, for the consideration of vacant stores as sales comparables for valuing big-box retail properties in the fee simple, some assessors and appraisers disagreed.

Their primary concern was that consideration of sales of vacant properties would result in lower assessed values of big-box retail properties, thereby harming the local community by depleting the tax base. The "Dark Store Theory" developed out of this concern.

The Dark Store Theory received a significant amount of press, especially in Indiana and Michigan, where the theory was spun into a populist argument against "a tax loophole," which supposedly allowed national corporations to avoid paying their fair share of taxes in local communities.

Many news sources perceived the Michigan court system's valuation of big-box properties in the fee simple as a "big discount" to corporations that was "unfair to locally-owned businesses who can't get the same discounts."[19]

Michigan Representative Steve Dianda, D-Calument, asserted that the Dark Story Theory was a loophole that rewards "companies for gaming the state's tax system" by allowing them to avoid paying "their fair share for police, fire, and the other local services they demand."[20]

As the theory received more media exposure, it also gained traction with courts in several states, including New York, Wisconsin, and Iowa.

In *Rite Aid Corporation v. Huseby*, the New York Supreme Court, Appellate Division, held that the court must apply a "recent sale of the subject property, as well as readily available comparable sales," regardless of the nature of the interests being sold.[21]

Accordingly, the court reversed a lower court's decision to reject the long-term built-to-suit lease of the subject property, as well as other built-to-suit lease transactions.[22]

Similarly, in *Bonstores Realty One, LLC v. City of Wauwatosa*, the Wisconsin Court of Appeals approved of the city appraiser's rejection of "any

conversion, redevelopment, or 'dark store' sales under the premise that those sales have a different highest and best use" than an operating store.[23]

Citing *Bonstores*, the Wisconsin District Court subsequently rejected all of the taxpayer's appraiser's vacant sales in *Target Corporation v. City of Racine*, stating that "dark stores should not be used as comparables" because "Target is not a dark store and does not share the same highest and best use as a dark or vacant store."[24]

In *Hy-Vee, Inc. v. Dallas County Board of Review*, the Iowa Court of Appeals concluded that "[i]n focusing on property that matched Hy-Vee's business [i.e., sales of operating grocery stores], the Board's expert fulfilled his obligation to classify property according to its present use and not according to its highest and best use."[25]

The Legislative "Fix"

Although courts in several states have already adopted the Dark Store Theory (to varying degrees), some states have turned to the legislature to advance the Dark Store Theory argument.

In 2015, Indiana passed two laws specifying how to value big-box retail properties which, as explained in more detail below, have already been repealed.

Indiana Code Section 6-1.1-4-43 required any big-box retail building that is 50,000 square feet or greater, occupied by the original owner or by a tenant for which the improvement was built, and has an effective age of 10 years or less, to be valued under the cost approach, less depreciation and obsolescence.

Indiana Code Section 6.1.1-4-44 limited the types of sales comparables that could be used in the assessment of commercial non-income-producing

real property, including sale-leaseback property (but excluding multi-tenant income producing shopping centers), with an effective age of 10 years or less.

Section 44 prohibited a real property sale from being used as a sales comparable if it

> (1) has been vacant for more than one (1) year as of the assessment date or in the case of industrial property vacant for more than five (5) years; (2) has significant restrictions placed on the use of the real property by a recorded covenant, restriction, easement, or other encumbrance on the use of the real property; (3) was sold and is no longer used for the purpose, or a similar purpose, for which the property was used by the original occupant or tenant; or (4) was not sold in an arm's length transaction.

The Michigan legislature also attempted to provide special requirements for valuing big-box retail properties for tax purposes. Michigan Senate Bill 524 was introduced in the Fall of 2015. If it had been enacted, Bill 524 would have amended the general Property Tax Act by requiring that the highest and best use of big box properties and other limited use properties be for the continued use of the property as improved.

This bill was intended to prohibit the consideration of vacant big box properties in establishing the taxable market value of occupied big-box properties.

A complementary bill was also introduced in the Michigan House of Representative. House Bill 4909, if enacted, would have amended the Zoning Enabling Act by preventing negative use restrictions that prohibit occupancy or use of the property, when that restriction is inconsistent with the lawful use of the property under the local zoning ordinance.

This bill was intended to prohibit the consideration of deeds frequently placed on big-box stores that restrict future use of the property in determining the true cash value of the property. Neither bill has passed.

The Constitutional Problem

The problem with the Dark Store Theory is that it is unconstitutional under most states' constitutions. The majority of state constitutions require uniformity in taxation. This is why most ad valorem property tax schemes value property in the fee simple.

Valuing property in the fee simple ensures that all property is assessed equally. Valuing property in the leased-fee, on the other hand, can lead to different assessed values for identical properties depending on who owns the properties and how they are used. The following hypothetical example illustrates this point:

Let's assume there are two identical buildings located across the street from each other. One building is vacant and the other building is leased. The value of the fee simple estates are the same. The value of the leased-fee estates, however, could vary drastically depending on whether the lease on the leased property is long or short term or is above or below market.

Valuing the two identical buildings differently would violate the uniformity clause of most state constitutions. That is why real property is most often valued in the fee simple (as if vacant and available for sale).

Based on the foregoing, Indiana Code Sections 6-1.1-4-43 and 44 could have been held to violate the uniformity clause of the Indiana State constitution. Presumably, this concern played a significant role in the recent repeal of those statutes less than one year after their adoption, on March 24, 2016. In their place, Indiana modified existing classification provisions to provide for the classification of improvements on the basis of market segmentation.

Indiana likely made this change to provide for a constitutional means of assessing occupied properties differently from vacant properties by classifying them differently, since uniformity in taxation is generally only required across the same class of property.

However, it is the authors' opinion that Indiana's new classification provisions still raise constitutional concerns regarding uniform taxation within the new class of occupied properties if it leads to the stores being valued in the leased fee.

Modifying the example above, so that the two identical buildings are both occupied, the value of their respective leased fee estates may still be significantly different based on the terms of leases in place and whether their respective rents are above or below market.

Additionally, the leased fee value of the buildings are significantly influenced by their respective occupants' creditworthiness, gross sales, and so on, thereby resulting in different property values based on who occupies the building in addition to whether the buildings are occupied at all.

The irony is that proponents of the Dark Store Theory describe it as a "discount" applicable only to large big-box retail stores; however, under most state constitutions and their corresponding ad valorem property tax regimes, a big-box store should be valued under the same real estate appraisal standards as every other type of property.

Conclusion

By manipulating real estate appraisal practices to increase the assessed values of operational stores, assessors are actually moving away from uniform taxation—the very goal they are constitutionally bound to seek.

When faced with a Dark Store Theory Argument, one solution is to identify the constitutional dilemma, to argue a return to the basics of fee simple valuation, and to value the property according to generally accepted real estate appraisal methodology.

Notes:

1. *Dictionary of Real Estate Appraisal*, 5th ed. (Chicago: The Appraisal Institute, 2010), 79.
2. Kohl's Indiana LP v. Howard Cty. Ass'r, Nos. 34-002-10-1-4-00350 et al. (Ind. Bd. Tax Rev. Dec. 31, 2014).
3. Id. at 40 (quoting Shelby County Assessor v. CVS Pharmacy, 994 N.E.2d 350, 354 (Ind. Tax Ct. 2013) (emphasis added).
4. Id. at 43.
5. Ikea Prop. Inc. v. Twp. of Canton, No. 366639, slip op. at 34 (Mich. Tax Tribunal July 18, 2012).
6. Id. at 14-15.
7. Kohl's Dep't Stores, Inc. v. Twp. of Frenchtown, No. 369836, slip op. at 34-35 (Mich. Tax Tribunal Feb. 22, 2013).
8. Id. at 33.
9. Id. (citations and internal quotation marks omitted).
10. Kohl's Dep't Stores, Inc. v. Twp. of Kochville, No. 369840 (Mich. Tax Tribunal Feb. 22, 2013) (internal quotation marks and citations omitted).
11. Id. at 35-36 (citations and internal quotation marks omitted).
12. Lowe's Home Ctrs., Inc. v. City of Grandville, No. 317986, 2014 WL 7442250, at *6 (Mich. Ct. App. Dec. 30, 2014).
13. Lowe's Home Ctrs., Inc. v. Twp. of Marquette, No. 314111, 2014 WL 1616411, at *10 (Mich. Ct. App. Apr. 22, 2014), appeal denied, 856 N.W.2d 553 (2014), reconsideration denied, 861 N.W.2d 17 (2015).
14. Id. at *11.
15. Matter of Home Depot U.S.A. Inc. v. Assessor of the Town of Queensbury, 12 N.Y.S.3d 364, 364 (N.Y. App. Div. 2015), leave to appeal denied, 26 N.Y.3d 915 (2016).
16. Walgreen Co. v. City of Madison, 752 N.W.2d 687, 702. (Wis. 2008).
17. Id. at 703.
18. In re Equalization Appeal of Prieb Properties, L.L.C., No. 2004-3806 EQ, slip op. at XX (Kan. Bd. of Tax Appeals June 8, 2007).
19. Jake Neher, Lawmakers to make major push to end property tax discounts for big box stores, Michigan Radio (Aug. 10, 2015), http://michiganradio.org/post/lawmakers-make-major-push-end-property-tax-discounts-big-box-stores#stream/0.
20. Nick Manes, Unfair Comparisons? Meijer, other big-box retailers use 'dark store' loophole to cut their Michigan property tax bills, MiBiz (Aug. 16, 2015), http://mibiz.com/news/design-build/item/22798-unfair-comparisons-meijer,-other-big-box-retailers-use-%E2%80%98dark-store%E2%80%99-loophole-to-cut-their-michigan-property-tax-bills.
21. Rite Aid Corp. v. Huseby, 13 N.Y.S.3d 753, 757 (N.Y. App. Div. 2015).
22. Id.
23. Bonstores Realty One, LLC v. City of Wauwatosa, 839 N.W.2d 893, 902 (Wis. Ct. App. 2013).
24. Target Corp. v. City of Racine, Nos. 10 CV 1963 et al., slip op. at (Wis. Cir. Ct. Nov. 30, 2015).
25. Hy-Vee, Inc. v. Dallas, No. 13-1377, 2014 WL 4937892, at 5 (Iowa Ct. App. Oct. 1, 2014).

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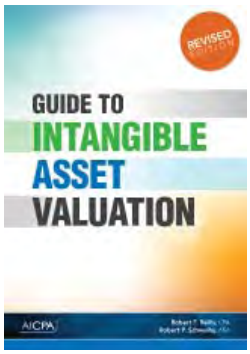

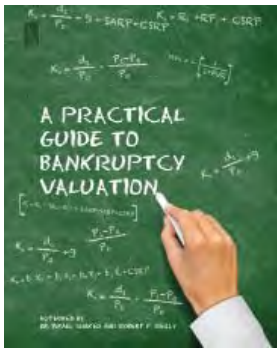

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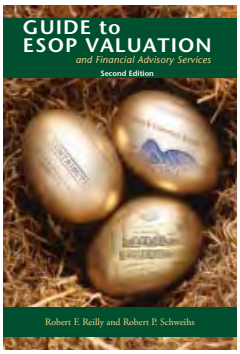

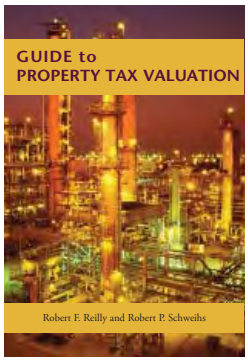

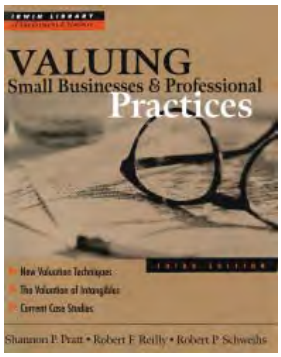

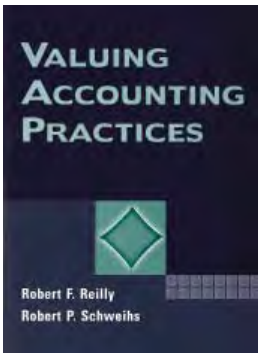

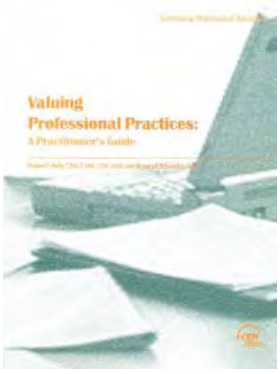

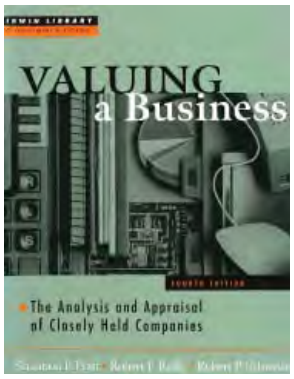

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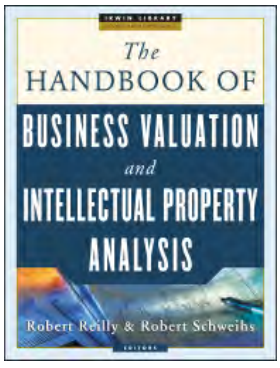

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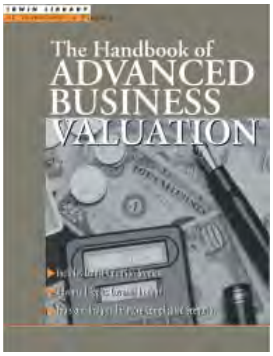

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Clean Energy—Implications from an Ad Valorem Tax Perspective

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Ad valorem taxation valuation practice around the country relating to the assessment of clean energy projects ranges from complete exemption to conventional depreciated replacement cost. While clean energy valuation issues remain uncertain in many jurisdictions, what is certain is that the growth of clean energy is not going to slow down in the near future. The U.S. Energy Information Administration, or EIA, projects that 46 percent of new electricity consumption in the United States will come from clean energy by 2030.[1] Until property owners, assessing officers, and legislators are able to agree upon consistent and uniform guidelines for the valuation and taxation of clean energy projects in each state, litigation in this area is expected to continue.

Introduction

In 2015, clean energy projects consisting of wind, solar, biomass, geothermal, and hydropower accounted for over 65 percent of new installed U.S. electrical generating capacity (11,298 MW of the 17,272 MW total installed).[2]

In addition, U.S. clean energy investments in 2015 exceeded $56 billion.

The significant role of clean energy in providing new electric generating capacity is continuing a trend that has been more than a decade in the making.

Clean energy projects are frequently seen as beneficial to the sparsely populated rural counties in which they are often located. However, the issue of how these projects are valued for ad valorem property tax purposes has evolved on an ad hoc basis around the country.

Not surprisingly, state and local ad valorem property assessment practices have yet to converge on any uniform treatment.

This divergence of practice is leading to a great deal of uncertainty both to property owners and to property tax assessment authorities.

Clean Energy—What Is It and Where Is It?

Clean energy, also referred to as *renewable energy* or *green energy*, specifically refers to energy produced from renewable resources without creating environmental debt. The basic forms of clean energy are often cited as those that come from water, wind, or sun.

Clean energy sources now account for 17.83 percent of total installed U.S. operating generating capacity: water accounts for 8.56 percent; wind accounts for 6.31 percent; biomass accounts for 1.43 percent; solar accounts for 1.20 percent; and geothermal steam accounts for 0.33 percent.

Over half of the total renewable energy generation is provided by five states: Washington, Oregon, California, Texas, and New York. For 2015, the most significant wind capacity additions occurred in Texas, Oklahoma, Kansas, Iowa, and Colorado. The most significant solar capacity additions occurred in California, North Carolina, Nevada, Massachusetts, and New York.

In 2015 the United States saw a slowing of natural gas power plant additions compared to 2014, while solar and wind power capacity combined outpaced the 2014 installation rate.[3]

No utility-scale coal plants have been added since 2013. Wind and solar energy, which generated only 3 percent of U.S. electricity in 2010, are projected to experience significant growth and provide 17 percent of electricity by the year 2030.

Valuation—The Importance of Clarity and Predictability

Owners of clean energy properties, like all property owners, want to pay as little in property taxes as possible, but they are willing to pay their fair share of those taxes. Assessing officers, whose primary role is to determine the fair market value of properties placed on the tax roll, strive to be fair in their assessments.

Unfortunately, assessors face certain statutory, policy, and valuation constraints and challenges that can make the appraisal of clean energy properties challenging.

Additionally, assessors often feel pressured by representatives of taxing jurisdictions to raise property values, as higher values result in higher tax revenue. These competing forces often lead to a significant disparity between the initial assessed value of a property, the value urged by the property owner, and the final value determined through litigation.

Inconsistent Assessments

What appears to most often lead to litigation over the assessed value of clean energy properties around the country is the inconsistent assessment treatment of identical properties from county to county, and state to state.

Directors of tax for some of the major clean energy companies have uniformly indicated that what is important to them in the valuation of their projects is two things: clarity and predictability.

It is important to the success of clean energy companies that they be able to accurately forecast their property tax bills from year to year for planning purposes.

Unfortunately, clarity and predictability vary widely around the country, which has led to costly litigation, but has also led to successful legislative efforts to eliminate the problems.

There are many factors that complicate the valuation of clean energy properties. Solar photovoltaic (PV) systems, for example, are unique in that their costs, including the cost to construct utility scale projects, have decreased dramatically over the past 10 years.

Costs for new solar PV projects are expected to continue to decline significantly each year as new and more economical technology is developed. Representatives of taxing jurisdictions at times seem unable to understand how a project that cost $50 million to build is worth half that value two years later.

"A lack of clarity and predictability in the valuation of all types of properties harms not only property owners, but also taxing jurisdictions."

Federal subsidies for the cost of construction of clean energy projects, renewable energy certificates, power purchase agreements, locational issues, and project efficiency further complicate the valuation process and highlight the need for clarity and predictability.

States such as Nebraska, Wisconsin, and Illinois have each passed state laws that dictate how wind farms are taxed. This is extremely beneficial to companies in forecasting property tax bills and has significantly reduced litigation over the value of those properties.

Texas currently falls on the other end of the spectrum. There are no agreed-upon formulas or state laws that dictate a uniform method of valuing most clean energy properties.

Although the basic methodology for the valuation of such properties in Texas has been established, appraisal districts often apply their own "unique" adjustment factors. These adjustment factors often have no support in literature. Rather, they are based on the appraiser's "years of experience."

This somewhat haphazard technique can result in a significant variation in assessed values as determined by various appraisal firms hired by the appraisal districts in each county. Similar properties in neighboring counties, or across the state, can have a wide range of assessed values.

It is understandable why in states where the valuation of identical types of properties can vary by county, there is going to be an increased amount of property tax litigation. A lack of clarity and predictability in the valuation of all types of properties harms not only property owners, but also taxing jurisdictions.

Taxing jurisdictions rely on the tax roll to budget for future planning purposes, and clean energy projects may account for a major portion of the taxable value in a given county.

When property tax litigation results in a significant reduction in the final assessed value of a property, often after several years in the court

system, taxing jurisdictions can be thrown into fiscal disarray. Jurisdictions that were expecting a certain amount of revenue based on the initial assessed value are forced to find the funds to issue a refund to the property owner.

Case Study—Attempting to Value the Wind

Whatever wind is, it's inherent in the value of the land.[4]

An example of how a lack of predictability or uniformity in the appraisal of clean energy property can lead to litigation occurred in Scurry County, Texas. Scurry County is located in northwest Texas near the city of Lubbock, and has been referred to as the Saudi Arabia of wind power.

It is home to several of the largest wind energy projects in the United States. And, it is also home to one of the tallest wind towers in the United States, standing in excess of 345 feet in height.

Beginning in 2011, a local assessing officer sought to appraise for taxation the lease payments being paid by wind turbine companies to lease the land in Scurry County. He created his own methodology, which could not be found in any learned treatises.

The assessing officer carved out 0.0290/acre tracts of land where the wind turbines were sited, which he referred to as "wind tower sites," and increased the value to only those sites using an income approach based on lease payments.

Land in Scurry County has traditionally been used for agriculture and hunting, and the land is valued at an average of about $900 per acre. At $900 per acre, a carved-out 0.0290/acre section should be valued at $26.10.

However, the appraisal district, in applying the local assessor's self-created methodology, changed the assessed value on the newly created 0.0290 per acre "wind tower sites" to $55,000 each. That valuation is the equivalent of one acre of land in Scurry County being worth approximately $1.9 million! This new methodology resulted in a significant increase in the potential tax liability to the wind farm owner in that county.

Following a survey of other counties with wind turbines, it was determined that out of the 11 surveyed, 4 county appraisal districts did not separately value wind turbine sites and 7 did value the sites.

Of the seven appraisal districts that valued the sites, the values applied to each site varied substantially, with Scurry County being the most egregious valuation. Litigation was brought by the wind farm operator against the local appraisal district.

In Texas, land is valued to its highest and best use as if vacant. When owning land, the owner acquires a bundle of rights, including the right to lease the property. The market takes that fact into account when valuing the fee simple estate.

Wind energy companies enter into leases with land owners for the right to install wind turbines and related equipment. The value of those leases is included in the fee simple estate and should be reflected in the sales price for such properties. Texas law requires that property not only be on the appraisal roll at market value, but that the value be equal and uniform to other comparable property, similarly situated.

In the Scurry County lawsuit, experts were designated by both sides and a substantial amount of discovery took place. A review of the terms of a typical wind lease highlighted one of the fatal flaws in the methodology developed by the appraiser.

Generally, each wind farm lease entered into with a property owner is to lease several hundred acres of the owner's land. For the Scurry County project, on average, one wind turbine was installed for every 160+ acres of land. Under the terms of the lease, the wind farm operator has rights over the entire leased property for wind energy purposes.

The operator has the right to construct wind turbines wherever deemed appropriate; the right to relocate the turbines; and the right to install underground and overhead lines, roads, storage facilities, control buildings, and telecommunications facilities. Additionally, the wind turbine company has the right to ingress and egress on the property.

The assessor's methodology in Scurry County ignored the fact that the wind farm operator was leasing far more than just a "wind tower site." This company leased over 27,000 acres in Scurry County for its project on which it had installed 167 wind turbines.

The net result of this flawed methodology was that the appraisal district was placing $9.2 million in value on 4.843 acres of "wind tower sites" (167 turbines × 0.0290/acres) out of over 27,000 acres of leased land, and was placing $0 dollars of additional value on the remaining 26,995+ acres under lease.

The case was finally settled after the deposition of the principal expert hired by the appraisal district, who was forced to admit that the appraised value which he had calculated for each "wind tower site" actually included far more assets and property than the value of the "wind tower site."

In order to reach the value placed on the property by the appraisal district, he valued the wrong property. The appraisal district no longer had a cause of action. The county now values each wind tower site at the average value of a typical acre of land in Scurry County.

Unique Appraisal Issues

A survey of states with significant clean energy development reveals that each state has its own unique property appraisal, assessment administration, and property tax policy issues.

No state uses the exact same valuation methodologies, provides the exact same property tax abatements, or has the exact same legislative property tax policies relating to the promotion of clean energy.

There are a number of excellent websites and papers that provide detailed information regarding the property tax treatment of clean energy properties by state.[5]

Uncertainty

Property taxes represent a potentially significant cost for solar PV system owners. Apart from California, which extended its property tax exemption for solar power systems to 2025, the ambiguity around solar and property taxes gives every indication it may get worse before it gets better.

While many U.S. states have adopted policies specifically addressing how solar PV systems should be valued for property tax purposes, a number of states have not adopted such policies, leaving it up to local tax assessors to determine how to value solar assets.[6]

Officials in a number of states have been responding to increasing criticism over the cost of clean energy by calling for an end to tax breaks and subsidies, which could significantly impact the valuation for property tax purposes of clean energy properties in the future.

Texas Comptroller of Public Accounts, Susan Combs, in September of 2014, said it is time for the state to change how it approaches electricity—including additions to its large portfolio of wind energy. "It's time for wind to stand on its own two feet," Combs said in a statement.[7]

"Billions of dollars of tax credits and property tax limitations on new generation helped grow the industry, but today they give it an unfair market advantage over other power sources." "When taxpayers are asked to foot the bill for energy policy choices, we need to be sure they are the right choices," Combs said in the letter.

Because property taxes are abated for some period of time on many clean energy projects around the country, property owners are often less concerned about the value placed on their property. As those abatements begin to expire, expect legislation to extend the abatements, legislation to establish a method of valuing the properties, or a significant increase in property tax litigation relating to the assessed value of those projects.

Net Metering

As the use of solar power skyrockets across the United States, disputes have arisen in several states over how much customers should be compensated for excess power produced by their solar panels and sold back to the grid—a policy known as net metering.

Net metering laws have come under fire from a number of groups, primarily backed by fossil fuel corporations and utility companies. Forty-three states and the District of Columbia currently have net metering policies in place. The groups have set their sights on repealing them, often referring to homeowners and small business owners with their own solar panels as "free-riders on the system."

Oklahoma may be the first complete defeat for solar advocates in their fight against utility efforts to recover costs lost to distributed generation use. Net metering survived attacks in Colorado and Kansas, and Vermont recently increased its policy in a bipartisan effort.

The rapid growth in rooftop solar is catching utilities off-guard across the United States and many are fighting back against the trend due to the perceived threat it poses to their bottom line. Quite simply, more customers installing their own rooftop solar panels means they are producing more of their own electricity and buying less from their utility company.

Any significant changes in the assessment of fees to individuals or small business that generate their own electricity through clean energy devices will

likely have an impact on property tax valuation of such devices in the future.

What Does the Future Hold?

The one certainty concerning clean energy is that it is here to stay, and property owners and assessors will have to continue to deal with a myriad of issues regarding the valuation of such properties for ad valorem tax purposes. The industry continues to mature and make its presence felt among decades old, fossil-fuel energy sources.

Over 30 states and territories, and the District of Columbia, currently have renewable portfolio standards, policies designed to increase generation of electricity from renewable resources. These policies require or encourage electricity producers within a given jurisdiction to supply a certain minimum share of their electricity from designated renewable resources.

Generally, these resources include wind, solar, geothermal, biomass, and some types of hydroelectricity, but may include other resources such as landfill gas, municipal solid waste, and tidal energy.

Clean energy sectors are expected to continue to grow over the next 10 years. As clean energy grows, assessors in each state will face the complicated task of working with property owners, appraisers, legislators and others to deal with the valuation of such properties.

The strongly worded pronouncement from the Texas Comptroller of Public Accounts that "it's time for wind to stand on its own two feet" is a sentiment echoed around the country that property tax incentives and other types of subsidies offered to clean energy projects are going to face ever increasing scrutiny.

If incentives such as abatements are withdrawn or are no longer granted, some argue that certain clean energy projects will cease to be economically viable. As abatements expire, litigation regarding the valuation of clean energy projects is likely to increase.

The growth of rooftop solar PV and other distributed generation (DG) and energy storage assets is challenging the traditional utility centralized generation business model as never before.

Many large utility companies are now fighting regulatory battles in about a dozen states as they attempt to reduce the credits that rooftop solar customers get for the electrons that their PV panels return to the grid. The outcome of these battles will affect the valuation of solar properties in the future.

Clean energy technology is rapidly changing and becoming increasingly economical. When designing clean energy property tax policies to deal with this technology, policy makers must confront a number of challenges. One is the diversity of the technology and how it is employed by its owners.

Identical models of a wind turbine, for example, have different efficiencies based on where they are located and their technical configurations. These variations need to be understood by assessors and other policy makers to insure fair valuations.

Conclusion

The desire for clarity and predictability with regard to the assessment and taxation of clean energy properties is shared by both assessors and property owners. Policies should continue to be developed in each state that strive for permanence and predictability.

Clean energy companies and assessors should work together to develop systems that improve the ability of assessors to consistently and accurately value clean energy properties using generally accepted property appraisal methods.

Local, state, and national energy and tax policies will ultimately determine if, or how, this value is taxed. If all parties invested in this process work towards greater clarity, permanence, and predictability in the assessment of clean energy properties in the future, litigation will be reduced significantly. Working together, assessors and property owners will be able to form a healthier climate and stronger economy.

Notes:

1. U.S. Energy Information Administration.
2. "Energy Infrastructure Update for January 2016" Federal Energy Regulatory Commission's Office of Energy Projects.
3. U.S. Energy Information Administration.
4. For an interesting live daily wind map of the United States, see Wind Map website at http://hint.fm/wind/.
5. For a comprehensive guide to state incentives/policies for renewables & efficiency, see U.S. Department of Energy Website http://dsireusa.org; and "Property Taxes and Solar PV Systems: Policies, Practices, and Issues," Justin Barnes, et al., July 2013.
6. See U.S. Department of Energy Website http://dsireusa.org.
7. Texas Power Challenge—Getting the Most From Your Energy Dollar, Susan Combs Comptroller of Public Accounts.

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Best Practices

The Valuation of Computer Software in the Health Care Industry

John E. Elmore, JD, CPA

Taxpayers are often unaware of the fact that in many tax jurisdictions a portion, if not all, of the software incorporated in medical equipment and health-care-related information technology (IT) systems may be exempt from ad valorem property taxation. Under those circumstances, the property tax assessment should reflect a deduction for the value of the nontaxable software. This discussion presents generally accepted methods that valuation analysts may use to value health care industry computer software for property tax purposes.

Introduction

In many jurisdictions, the property tax is an "ad valorem" tax. That means that the taxpayer property is taxed according to the value of the property. Valuation analysts often assist in the taxation process by valuing the personal property subject to the tax. The taxation of computer software as personal property is a phenomenon of the modern era that may not fit easily within the traditional definitions of tangible personal property and intangible personal property.

Attempts by state tax authorities to address this issue has resulted in an incongruous collection of state-specific rules and methods by which valuation analysts and tax advisers contend for guidance in determining what portion of a taxpayer's computer software assets is taxable and what portion is tax-exempt. This discussion presents an overview of the valuation of computer software for property tax purposes, with an emphasis on the health care industry.

Computer Software in the Health Care Industry

Computer software is revolutionizing health care. Advances in the delivery and efficacy of health care are driven mostly by advances in technology—technology that depends largely on software. Computer software is used in virtually all fields of medicine and throughout the health care industry.

Examples of the use of software in health care include the following:

1. Medical devices, including devices for diagnostics and monitoring
2. Surgical robots
3. Medical imaging systems
4. Telemedicine
5. Electronic medical records processing and storage
6. Medical diagnosis and expert systems
7. Nuclear medicine equipment
8. Radiation oncology and linear accelerator equipment
9. Pharmaceutical and biotechnology research, including drug discovery
10. Genetic testing and personalized medicine
11. Health care management information and billing systems
12. Health care analytics for epidemiology and population health management

In many cases, software operates on conventional computer servers and laptops. Many of the categories include specialized hardware devices, such as surgical robots and diagnostic machines. These devices tend to be more specialized than general-purpose computers and operate "embedded" software.

Embedded software is similar in most respects to other software, though traditionally embedded software was designed to operate under memory size and computer power constraints, often using specialized computer processors.

For example, in California, the Orange County Assessor's Office levied significant personal property taxes on Cardinal Health 301, Inc. (Cardinal), a manufacturer and lessor of medical equipment for automatically dispensing and tracking medicine—a kind of computerized "medicine storage cabinet."[1]

The Assessment Appeals Board noted that 90 percent of the assessed value of each unit leased was attributed to proprietary embedded software. Cardinal challenged the property tax assessment in court and won on the position that the embedded software did not constitute a taxable asset under California property tax law.

Taxpayers are often unaware of the fact that in many tax jurisdictions a portion, if not all, of the software incorporated in medical equipment and healthcare-related information technology (IT) systems is exempt from property tax. Under those circumstances, the property tax assessment should reflect a deduction for the value of the nontaxable software.

Identification of the Computer Software Subject to Taxation

A few states assess property taxes on intangible personal property, including computer software. Virginia, for example, specifically defines "computer application software" as taxable intangible personal property.[2]

As a general rule, however, most state tax jurisdictions do not tax intangible personal property. Therefore, taxpayers have sought to avoid taxation of computer software by claiming that the programs and services of which it is composed constitute intangible property.

Three general lines of reasoning have been devised by state courts to determine whether computer software is tangible or intangible:

1. Whether one is purchasing a tangible storage medium versus the intangible knowledge contained therein
2. Whether software is an operational program or an application
3. Whether software is "custom" or "canned"

The first line of reasoning, which we may call the "container test," focuses on a substance-over-form inquiry involving two components:

1. A physical storage medium (e.g., a magnetic tape, compact disc, or digital versatile disc)
2. The knowledge/information contained on the medium

Intangible knowledge in this context refers to the abstract representation of human knowledge in the form of computer code, which instructs a microprocessor to perform computational tasks to manipulate and communicate this intangible knowledge.

Starting in the early years of computing, tax authorities sought to characterize software by the tangible form in which it was stored and distributed. The container test examines whether the intangible knowledge (that is, the computer code) contained within a tangible medium is a significant factor for tax purposes and whether the tangible medium may be considered merely incidental to the purchase of that intangible knowledge.

The container test appears increasingly outdated in today's computing environment, as the use of tangible storage mediums for software distribution has waned and software is routinely downloaded to computers directly or accessed on demand from servers in a cloud network.

For example, in 1996, the Texas Court of Appeals ruled that software was intangible property and, therefore, not subject to ad valorem taxation.[3]

The court said that the software was intangible because the "essence of the transaction" was not the tangible medium that was used to transport the software to the consumer (for example a disk or CD-ROM) but rather the software it contained.

"Computer application software," the court reasoned, is intangible personal property consisting of imperceivable binary pulses, programs, routines, and symbolic mathematical code that controls functioning of computer hardware and directs hardware operations; therefore, it was not subject to ad valorem taxation as tangible personal property.

A number of states have emphasized a second line of reasoning that focuses on how separable the software is from the computer hardware on which it operates. Some states insist that software is essentially inseparable from the tangible hardware on which it operates.

The Ohio Supreme Court, for example, upheld the Ohio Department of Taxation position that all software was taxable under the reasoning that the encoded instructions are always stored in some form of physical memory—a tangible medium—when operating in a computer.[4]

Therefore, in Ohio, the entire computer and all of the software operating thereon is taxable.

In other states, the issue of separability usually takes the form of classifying software either as:

1. operational software or
2. application software.

Operational software is generally required in order for the computer to function. Sometimes operational software is described as "embedded" software (or "firmware"). This is based on the fact that the software is encoded into memory chips attached directly to the circuit board of a computing device. Embedded software is often ascribed to specialized computing devices that lack many of the features and attachments associated with a general-purpose computer.

But even a general-purpose computer, like a laptop computer, contains embedded software in the form of a basic input output system (BIOS). BIOS is permanently stored in a memory chip on a computer motherboard (the primary circuit board). It is always and automatically executed when the computer is turned on.

It serves as the fundamental, real-time operating system (OS) for managing the microprocessor(s) on the motherboard and the peripheral devices that attach to the motherboard. For a laptop computer, these attached devices include a hard drive, a video graphics card, a network adapter, a keyboard, and a touchpad.

Depending on the tax jurisdiction, however, operational software may have a more expansive definition and include a general-purpose OS that works in conjunction with the BIOS.

The general-purpose OS is software typically stored on a larger memory medium, such as a disk drive, that is loaded and executed by the BIOS to provide a more sophisticated operating environment (e.g., graphical user interface, multitasking features). Two examples are:

1. the Linux operating system and
2. the Microsoft Windows operating system.

It is upon the foundation of the BIOS and the general-purpose OS that application software operates.

The Kansas Department of Revenue describes the distinction between operational software and application software as follows:

> The Kansas Supreme Court has held that software programs are taxable if they are operational programs; programs the computer cannot operate without. These programs are considered an essential portion of the computer hardware and are taxable as tangible personal property in conjunction with the hardware. On the other hand, application programs, which are particularized instructions, are intangible property, which is not subject to taxation in Kansas.

As a simple illustration, a laptop computer first executes a BIOS when it is turned on. This BIOS typically would be considered a tangible asset that is taxable. Once the laptop computer has booted up, a user may choose to execute an application such as Microsoft Office.

Office would qualify as tax-exempt application software because it executes "on top" of the BIOS and is not required for the computer to function (the laptop will operate normally regardless of whether Office is installed). The classification of the Windows OS, which also executes on top of the BIOS, as taxable operational software or tax-exempt application software can vary by tax jurisdiction.

This interplay of embedded operational software and general-purpose OSs can lead to complicated tax rules. Wisconsin statutory law exempts from property tax "mainframe computers, minicomputers, personal computers, networked personal computers, . . . electronic peripheral equipment, tape drives, [and] printers."[6]

The exemption does not apply to "equipment with embedded computerized components." In 2012, the Wisconsin Tax Appeals Commission rejected the property tax assessment of the City of La Crosse, Wisconsin, against a medical clinic on the grounds that the state's property tax law exempted medical equipment that connected to, and was controlled by, an external general-purpose computer.[7]

In that case, the taxpayer had reported its medical equipment as exempt in its personal property statements for the years at issue. The city tax assessor reclassified as taxable all the medical equipment except ultrasound and MRI equipment.

The Commission viewed the issue of taxability as whether the function of a medical device depended solely on an embedded OS, as opposed to being subject to control from a general-purpose OS executing on an externally attached computer.

The operational software/application software dichotomy offers a helpful guideline. But it is only a general guideline. Not all operational software is subject to property tax and not all application software is tax-exempt.

For example, California state law provides that the operational software must be preinstalled, or "bundled," on the computer equipment purchased or leased.[8]

Operational software that is not bundled generally is not subject to the property tax. Applications that are bundled with computer equipment are presumed by the California tax authorities to be subject to the property tax—a presumption that may be rebutted by a taxpayer with a sufficient evidentiary showing.

The third line of reasoning classifies computer software as either (1) software developed for internal use—"custom" software—or (2) software that is developed for commercialization (that is, for resale)—"canned" software.

Canned software typically includes software that is licensed to others and may be held by the developer as inventory. Under many state property tax statutes, custom software is taxed, while canned software is not.

An example of canned software is the Microsoft Office software suite. If company ABC purchases Microsoft Office along with a new laptop computer, the value of Microsoft Office ordinarily would not be included in the tax base (we are assuming the tax jurisdiction exempts "canned" software), while the value of the laptop computer would be included as a tangible asset.

This concept is fairly consistent with the operational software/application software dichotomy. The distinction in this line of reasoning becomes more evident if one considers that company ABC may be taxed on its laptop software if it instead builds a custom application with word-processing and other office-productivity features.

Taxability, under the third line of reasoning, hinges on the issue of customization, not on whether the software is application software.

In practice, the distinction between custom software and canned software sometimes can be difficult to discern. Classification problems arise when one considers the many ways in which software can be created, modified, and distributed. If a software developer is engaged to create software for a particular customer's specifications that will not be resold to others, it may be considered custom software.

But if the developer creates the software for a franchise chain and then licenses the software individually to 100 franchisees, some tax jurisdictions may classify the software as having been developed for commercialization even though the customers belong to the same franchise chain.

Another problem is reclassifying canned software as customized software. Canned software can be modified and/or incorporated into custom software, thereby changing its nature in the process. To what extent does modifying or incorporating canned software transform it into custom software for tax purposes?

There are no clear rules defining what constitutes customization. The Kentucky Department of Revenue recognized this problem, stating: "At present, there are no solutions to the problem of classifying software. Until such determination changes the classification of software, the Department classifies all software as tangible personal property."[9]

Computer Software Valuation Approaches and Methods

There are several generally accepted methods used in the valuation of computer software. These methods can be categorized into the three generally accepted intangible asset valuation approaches:

1. The cost approach
2. The income approach
3. The market approach

The following discussion of these approaches summarizes the common methods employed by valuation analysts in valuing computer software for property tax purposes.

Cost Approach

The cost approach is premised on valuing computer software based on some measure of cost. Two general types of cost may be estimated:

1. The reproduction cost new
2. The replacement cost new

The reproduction cost new reflects the cost to recreate the functionality of the subject computer software but in a form or appearance that may differ

from the subject computer software. The replacement cost new typically establishes a maximum amount that an owner would pay for a fungible intangible asset.

However, specially developed computer software is often unique and may not qualify as a fungible intangible asset. In many cases, an intangible asset is less useful than its ideal replacement. The cost of the subject intangible asset should then be adjusted to reflect the loss in economic value due to functional, technological, and economic obsolescence.

Under the cost approach, three methods that may be used to provide a cost indicator for computer software are as follows:

1. The trended historical cost method
2. The estimated historical cost method
3. The software engineering cost estimation model method

The Trended Historical Cost Method

In this method, actual historical computer software development costs are identified and quantified and then "trended" through the valuation date by an appropriate inflation-based index factor. The valuation analyst ordinarily should include all costs associated with the development of the subject computer software. An allocation of taxpayer company overhead costs and the cost of employee fringe benefits ordinarily should be included in addition to employee payroll costs if the taxpayer company personnel are employed in tasks related to the software development.

Historical costs ordinarily should include an allowance for the software developer's profit on the software development project, an allowance for entrepreneurial incentive to motivate the software development project, all direct development costs such as salaries and wages, and all indirect development costs, such as taxpayer company overhead and employment taxes/employee benefits.

The application of the trended historical cost method typically estimates the reproduction cost new of the subject computer software. In many cases, due to technological advances in programming languages or programming tools, for example, the replacement cost new for software may be lower than the reproduction cost new for the subject taxpayer software.

The Estimated Historical Cost Method

Sometimes historical development costs are not readily available. In this case, software development costs can be estimated using actual or estimated software development time (person hours, person months, and so on). The development cost estimate is computed by multiplying the development time by an associated cost metric using specific costs per software development person or a weighted average cost for the software development team. This cost is typically a full absorption cost.

As with the trended historical cost method, the valuation analyst should consider all relevant costs related to the software development as well as allowances for the software developer's profit and for entrepreneurial incentive.

The Software Engineering Cost Estimation Model Method

The valuation analyst may employ software engineering models in order to estimate either the reproduction cost new or the replacement cost new of the taxpayer company's computer software. Generally, the software engineering models were originally developed to assist software developers in estimating the effort time and human resources needed to complete a software project. These models have been adapted by valuation analysts for computer software valuation purposes.

The primary input to the software engineering models is a size-related metric. Capers Jones, a pioneering authority in the field of software cost estimation, observed: "Every form of estimation and every commercial software cost-estimating tool needs the sizes of key deliverables in order to complete an estimate."[10]

Jones lists six types of sizing:

1. Sizing based on lines of code
2. Sizing by extrapolation from function point analysis
3. Sizing by analogy with similar products of known size
4. Guessing at the size using "project manager's intuition"
5. Guessing at the size using "programmer's intuition"
6. Sizing using statistical methods or Monte Carlo simulation[11]

Historically, the most common sizing metric has been the number of lines of code. The definition of a line of code and the associated line of code counting conventions vary among the common software engineering models. A line of code can be defined as source code instructions (i.e., instructions as written by human programmers) or object code instructions (what the computer produces after it has compiled, or translated, the source code into instructions the computer can more directly process).

Lines of code have meaning only within the context of the computer language being employed. Languages have evolved over time and can be classified into generations. As a general observation, higher-generation languages require less source code to perform the same tasks than lower-generation languages.

Source code written in assembly language—a second generation language—typically requires more source code instructions to perform a given set of tasks than third generation languages such as C, C++, and Java. And, source code written in a third generation language typically requires more source code instructions to perform a given set of tasks than fourth generation languages such as Python or Ruby.

To illustrate, Figure 1 presents the source code to display the words "Hello, world" in (1) assembly (a second generation language) and (2) Python (a fourth generation language). The valuation analyst should use software engineering models that account for language differences in estimating cost.

In an effort to address the deficiencies in the use of simplistic lines-of-code metrics, function-related metrics were developed to measure software development effort. The most common of these metrics is function points.

The number of function points in a computer program is often calculated with an algorithm that uses a weighted count of the number of inputs, outputs, user interactions/inquiries, data files, and external interfaces. The function point count is modified by the complexity of the development project.

Function point counts are sometimes used by software engineering models to estimate the number of lines of code based on an average number of lines of code established per function point for a given language. The discipline of function point analysis has evolved over time and has been standardized to a large extent by the International Function Point Users' Group.

Other inputs to the software engineering models include attributes such as: programming language experience and quality of the project team, software development tools used, programming practices, complexity type of application, time constraints, level of system documentation, and required program reliability.

Presently, three of the most commonly used algorithmic software cost estimation models are the following:

1. The Constructive Cost Model (COCOMO) and its derivatives
2. The KnowledgePLAN model
3. The Software Lifecycle Management (SLIM) model

These software cost estimation models are considered "algorithmic" models because they generate cost estimates using a set of quantified inputs, such as lines of source code, which is processed automatically in accordance with metrics and formulas derived from the empirical analysis of large databases of actual software projects.

Typically, the cost estimation models calculate an estimate of the effort required to develop a software system in terms of person-months. The number of person-months is multiplied by a blended cost per person-month to arrive at the indicated value of the computer software.

The blended cost per person-month is typically a full absorption cost (e.g., the cost of a software programmer would include benefits as well as wages).

Figure 1
Comparison of the Number of Lines of Source Code to Display "Hello, World"

```
.text
.global _start
_start:

mov $4, %eax /* write system call */
mov $1, %ebx /* stdout */
mov $msg, %ecx
mov $msgend-msg, %edx
int $0x80

mov $1, %eax /* _exit system call */
mov $0, %ebx /* EXIT_SUCCESS */
int $0x80

.data
msg: .ascii "Hello, world\n"
msgend:
```

(a) Assembly (2nd Gen.) —14 lines of code

```
print "Hello, world"
```

(b) Python (4th Gen.)—1 line of code

COCOMO

The first generation of COCOMO was developed in the 1980s.[12]

The software cost estimation methods estimate the amount of effort in person-months required to develop software, taking into consideration the size of the developed programs (particularly in lines of code), the program characteristics, and the environment in which they are developed.

The basic software development equation defined by the COCOMO II model is as follows:

$$PM = a(KLOC)^b \times EM$$

where:

PM	=	Person-months
$KLOC$	=	Thousands of delivered lines of code
a	=	Coefficient dependent on the class of project (organic, semi-detached, embedded)
b	=	Scaling exponent
EM	=	Effort multiplier

A more updated model, COCOMO II, was developed by researchers at the University of Southern California (USC).[13]

The updated model supports the cost estimation of a variety of third and fourth generation language-based projects. It also incorporates function point analysis. An online estimation tool encompassing the COCOMO II model is available through the USC Center for Systems and Software engineering website.[14]

We provide an illustration of a cost approach valuation analysis using COCOMO II, as described later in this discussion.

A third model, COCOMO III, is being developed by USC and its project partners with the aim of improving the model with new and updated software cost drivers and new development paradigms.

The COCOMO III project purpose statement indicates that this model will be more attuned to the increasingly diverse use of computer software in the health care environment, including software in biomedical devices (both as embedded systems and mobile devices) and "Big Data" health management analytics.[15]

KnowledgePLAN

KnowledgePLAN (KPLAN) is a proprietary function point-driven model that incorporates a historical knowledge base of project data derived from over 11,000 software projects that have been collected and researched by Software Productivity Research, LLC (SPR).[16]

The particular algorithms utilized by KPLAN have not been fully disclosed. The model uses a base of functional metrics to derive predictive/analytical productivity rates given a large number of known (or assumed) parameters. Projects are classified by, among other things, scope (e.g., program or application, sub-system), topology, (e.g., standalone, client/server), class (e.g., end-user developed, IT developed), and type (e.g., interactive graphical user interface, multimedia).

The size of the system can be expressed in several ways, including function points or lines of code, by language. The valuation analyst assigns attribute values that describe the personnel, technology, process, environment, and product.

KPLAN was updated in 2011 with the release of version 4.4, but SPR appears to have ceased support for the software cost estimation tool. The tool is still available for download from various software archive websites.

SLIM

The SLIM software engineering model was developed by Lawrence Putnam, the founder of Quantitative Software Management, Inc. (QSM). QSM licenses software cost estimation tools incorporating the model. The SLIM model (also referred to by commentators and in academic literature as the "Putnam model") estimates the amount of effort in person-months required to develop software based on the following:

1. A manpower build-up parameter (a number representing a range from entirely new software to rebuilt software)
2. The software delivery time
3. A productivity environment factor

The SLIM model was developed using a knowledge base of project data derived from over 6,000 software projects that have been collected and researched by QSM.

The main equation for the SLIM model is:

$$PY = \left[\frac{KLOC}{PROD \times TIME^{4/3}}\right]^3 \times B$$

where:

PY	=	Person-years
$KLOC$	=	Thousands of delivered lines of code
$PROD$	=	Productivity environment factor
$TIME$	=	Software delivery time
B	=	Manpower build-up parameter

Obsolescence

In computer software valuation under the cost approach, the valuation analyst ordinarily should consider all relevant forms of obsolescence. When the subject computer software is less useful than its ideal replacement, its cost should be adjusted to reflect a loss due to the following types of obsolescence:

1. Functional,
2. Technological
3. Economic

A fourth form of obsolescence, physical deterioration, is not generally applicable to computer software, as software typically does not experience physical wear and tear.

Functional obsolescence is the loss in value of an intangible asset because the subject intangible asset does not have the functionality of—or is less useful than—a replacement intangible asset. In the case of computer software, functional obsolescence is often mitigated when the subject software is continually maintained.

Technological obsolescence is often considered to be a particular component of functional obsolescence. It is the loss in value of intangible asset to two technological improvements that make the replacement intangible asset more efficient or effective than the subject intangible asset. In the valuation of computer software, technological obsolescence usually exists when:

1. the subject computer software is written in an inefficient or outdated language or
2. runs on a platform (hardware, operating system, and so on) that is becoming obsolete (and the software is not portable).

Technological obsolescence may also exist if the outdated models or practices of the developers result in a less-than-optimal use of resources.

Economic obsolescence is a reduction in the value of the subject computer software due to events that are typically outside of the control of the computer software owner/operator. Such events may include legal or regulatory changes or restrictions, or market conditions (for example, new competitors).

Economic obsolescence may be an important issue in the valuation of software developed for resale. Economic obsolescence is generally not very evident with regard to internally developed operational computer software that is being used by a financially successful taxpayer company.

Income Approach

In the income approach, the value of computer software is estimated as the present value of the future economic income attributable to the ownership of the computer software over its expected remaining useful life (RUL). This economic income may result from prospective (1) revenue, (2) cost savings, or (3) royalty or license income associated with the computer software.

The income approach methods used in the valuation of computer software include the following:

1. The yield capitalization (or "yield cap") method
2. The direct capitalization method

The discounted cash flow (DCF) analysis is a common yield capitalization valuation method.

The yield cap method, and in particular the DCF analysis, is typically used in the valuation of computer software when there is an identifiable income stream associated with the subject software.

Therefore, this method is often used in the valuation of product software or databases that generate income through their sale or license. The future cash flow related to such product software, for example, may be estimated by projecting revenue, expenses (excluding depreciation and amortization expense), and capital investments over the software estimated remaining useful life (RUL). The future cash flow projection is discounted to a present value using an appropriate present value discount rate.

Market Approach

In the market approach, the value of computer software is estimated by reference to actual market sale or license transactions involving comparable or

guideline software systems. This valuation approach may be difficult to use in the valuation of internally developed software.

The relief from royalty valuation method is used to estimate the cost savings that accrue to the taxpayer company owner/operator of the computer software. This valuation method assumes that the taxpayer owner/operator would otherwise have to pay a royalty or license fee on the revenue earned through use of the subject software.

The royalty rate used in the valuation analysis is based on an analysis of empirical, market-derived royalty rates for comparable or guideline computer software systems.

In the case of product software, a product revenue is projected over the expected RUL of the subject computer software. The market-derived royalty rate is then applied to estimate the royalty savings. The net after-tax royalty savings are calculated for each year in the RUL of the subject computer software. The net after-tax royalty savings are then discounted to a present value, as with the yield cap method.

Another market approach method used to value computer software is the market transaction method.[18] Under the market transaction method, where arm's-length market transaction data are available for comparable or guideline computer software, the implied value is typically expressed as a dollars-per-line-of-code or dollars-per-function-point figure.

This value per unit is then applied to the subject taxpayer company software lines of code (or function points) to estimate the value of the subject software. As with any valuation method that relies on comparable or guideline intangible assets, adjustments should be made for material differences between (1) comparable or guideline computer software and (2) the subject computer software.

A simple example of the market transaction method is presented in Exhibit 6.

Remaining Useful Life

Remaining useful life reflects the period during which the subject computer software is expected to contribute directly or indirectly to the owner's or licensee's future cash flow. It reflects the economic useful life and may differ from other measures of useful life, such as the amortization period for financial reporting purposes under generally accepted accounting principles (GAAP).

According to the Financial Accounting Standards Board (FASB) Accounting Standards Codification (ASC) topic 350-40-35-5, "Given the history of rapid changes in technology, software often has had a relatively short useful life."

In some instances, software that has been fully amortized under GAAP—based on expectations of a short useful life—may still be in use. It is not uncommon in taxpayer companies for software systems that were initially developed 20 to 30 years ago to remain in current use.

The estimation of the RUL may be an important consideration in each of the three generally accepted approaches to computer software valuation.

In the income approach, an RUL analysis may be performed in order to estimate the projection period for the prospective computer software economic income. In the cost approach, an RUL analysis may be performed in order to estimate the total amount of obsolescence, if any, from the estimated measure of cost.

In the market approach, an RUL analysis may be performed in order to:

1. select or reject comparable or guideline software license or sale transactions and/or
2. make adjustments to the comparable or guideline software sale and/or license transactional data.

Valuation Example

Exhibits 1 through 6 of this discussion present an example of a computer software valuation analysis. The results of the three methods are synthesized and presented in Exhibit 1.

Our example focuses on the fictional AlphaMed Company (AlphaMed), which performs medical diagnostic services and toxicology drug testing. Let us suppose the fair market value of the AlphaMed medical diagnostic and testing equipment (the "subject equipment"), as of the valuation date (January 1, 2016), has been estimated as $16.0 million. This value is inclusive of any software associated with the subject equipment.

Under the applicable local and state tax laws and guidelines, the software component of the subject equipment (the "subject computer software") qualifies as a tax-exempt intangible asset. AlphaMed has hired the valuation analyst to estimate the fair market value of the subject computer software.

Cost Approach—Replacement Cost New less Depreciation Method

For simplicity, let's assume the following;

1. The replacement cost new is estimated using the average results of two software engineering cost estimation models: COCOCO II and SLIM.
2. The line-of-code counts and other model inputs are as presented in Exhibits 2 through 4.
3. The average of the COCOMO II and SLIM efforts is multiplied by the obsolescence factor, where applicable, to arrive at the adjusted effort in person-months.
4. The analyst determined that the blended development cost per person-month was $8,600.
5. The analyst applied the blended development cost to the total adjusted effort in person-months to arrive at the total development costs.
6. The analyst applied a 10 percent developer's profit and a 15 percent entrepreneurial incentive to reflect the profit motive and opportunity cost associated with developing the AlphaMed software.

This method results in an indicated value estimate of the subject computer software of $8.3 million as presented in Exhibit 4.

Market Approach—Relief from Royalty Method

Let's assume the following additional facts related to the AlphaMed software:

1. Next year projected revenue attributed to the sale of medical diagnostic and testing services using the software is $45 million.
2. The annual revenue growth rate is 5 percent.
3. The market-derived royalty rate is 8 percent.
4. The effective company income tax rate is 40 percent.
5. The expected RUL of the software (until replacement or retirement) is five years.

This method results in an indicated value estimate of the subject computer software of $8.5 million, as presented in Exhibit 5.

Market Approach—Market Transaction Method

Let's assume the following additional facts related to the AlphaMed software:

1. The analyst estimates the total number of LOC as 570,000.
2. The comparable arm's-length software sale/licensing transactions were identified, yielding a sale transaction price per LOC.
3. The indicated price range is between $12.60 per LOC and $18.50 per LOC.
4. The range of indicated values for the subject software code is calculated as the market-derived price per LOC times the total number of LOC.

This method results in an indicated value estimate of the subject computer software of $8.9 million, as presented in Exhibit 6.

Valuation Synthesis and Conclusion

As presented in Exhibit 1, the three methods were provided an equal weighting.

The fair market value of the subject computer software, based on the valuation analysis described herein, as of the valuation date (January 1, 2016), is $8,540,000.

Effect on the Property Tax Assessment

The fair market value of the subject equipment was estimated as $16.0 million. However, this fair

market value estimate incorporated the value of the subject computer software.

As presented in Exhibit 1, the estimated fair market value of the subject computer software was $8.5 million as of the valuation date. Subtracting the value of the subject computer software yields a fair market value of $7.5 million ($16.0 million less $8.5 million) for the taxable portion of the subject equipment.

Therefore, the computer software valuation analysis resulted in properly reducing the AlphaMed property taxes on the subject equipment by more than 50 percent.

Notes:

1. See Cardinal Health 301, Inc., v. County of Orange, 167 Cal.App.4th 219 (2008).
2. Rulings of the Tax Commissioner, Document 13-47, Virginia Department of Taxation, available at http://www.tax.virginia.gov/laws-rules-decisions/rulings-tax-commissioner/13-47.
3. See Dallas Cent. Appraisal Dist. v. Tech Data, 930 S.W.2d 119 (Tex.App.-Dallas 1996, pet. denied).
4. See Andrew Jergens Company v. Wilkins, Tax Commr., 848 N.E.2d 499 (Ohio 2006).
5. "2016 Personal Property Valuation Guide," Kansas Department of Revenue, available at http://www.ksrevenue.org/pdf/PPVG.pdf.
6. See Wisconsin Statute §70.11(39).
7. See City of La Crosse v. Wisconsin Department of Revenue and Gundersen Clinic, Ltd., [2 Wis.] St. Tax Rep. (CCH) paragraphs 401-589 (Wis. Tax App. Commission June 8, 2012, incorporating June 9, 2008 ruling), aff'd id. paragraphs 401-658 (Wis. Cir. Ct. Dane County Dec. 7, 2012).
8. As discussed in Cardinal Health v. County of Orange, 167 Cal.App.4th 219, 222 (2008).
9. Kentucky Department of Revenue, Audit Manual, 2007.
10. Capers Jones, *Estimating Software Costs: Bringing Realism to Estimating*, 2d ed., (New York: McGraw-Hill, 2007), 8.
11. Ibid., 9.
12. For a detailed description of COCOMO, see Barry W. Boehm, *Software Engineering Economics* (New York: Prentice-Hall, 1981).
13. For a detailed description of COCOMO II, see Boehm et al., *Software Cost Estimation with COCOMO II* (New York: Prentice-Hall PTR, 2000).
14. See http://csse.usc.edu/research/COCOMOII/.
15. See http://www.cocomo3.com/about/.
16. KPLAN is described in a number of publications by Capers Jones. See note 6.
17. More detailed information about the SLIM model is available from the QSM website, http://www.qsm.com.
18. The market transaction method is often described in valuation literature as the comparable sales method, the comparable transaction method, or the like. See, e.g., James A. Amdur, "Telecommunications Property Taxation," *Federal Communications Law Journal* 46, no.2 (1994): 231.
19. Ibid.: 232.

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Exhibit 1
AlphaMed Company
Valuation Synthesis and Conclusion
As of January 1, 2016

Valuation Approach and Method	Indicated Value	Relative Emphasis	Concluded Value	Reference
Cost Approach—Replacement Cost New less Depreciation Method	$ 8,290,000	1/3	$ 2,763,333	Exhibit 4
Market Approach—Relief from Royalty Method	8,470,000	1/3	2,823,333	Exhibit 5
Market Approach—Market Transaction Method	8,860,000	1/3	2,953,333	Exhibit 6
Fair Market Value of Subject Computer Software (rounded)			**$ 8,540,000**	

Exhibit 2
AlphaMed Company
Cost Approach
COCOMO II Variables—Scaling Exponent
As of January 1, 2016

			Rating	Scale Factor
Scale Factors:				
	PREC	Precedentedness	High	2.48
	FLEX	Development Flexibility	High	2.03
	RESL	Architecture/Risk Resolution	Nominal	4.24
	TEAM	Team Cohesion	High	2.19
	PMAT	Process Maturity	Nominal	4.68
			Sum of the Scale Factors	**15.62**

Scaling Exponent (b) = 0.91 + 0.01 x 15.62 = 1.07

Exhibit 3
AlphaMed Company
Cost Approach
COCOMO II Variables—Effort Multiplier
As of January 1, 2016

			Rating		Multiplier
Product Factors:					
	RELY	Required System Reliability	Very High		1.28
	DATA	Data Base Size	Nominal		1.00
	CPLX	Software System Complexity:			
		Complexity-Control Operations	*Nominal*	*1.00*	
		Complexity-Computational Operations	*High*	*1.20*	
		Complexity-Device-Dependent Operations	*Nominal*	*1.00*	
		Complexity-Sensor Operations	*High*	*1.17*	
		Complexity-Data Management Operations	*Nominal*	*1.00*	
		Complexity-User Interface	*Nominal*	*1.00*	
		Average			1.06
	RUSE	Required Reusability	Low		0.75
	DOCU	Documentation Match to Life Cycle Needs	Nominal		1.00
Computer Factors:					
	TIME	Execution Time Constraint	High		1.09
	STOR	Storage Restraint	Very High		1.32
	PVOL	Platform Volatility	Low		0.87
Personnel Factors:					
	ACAP	Analyst Capability	High		0.80
	PCAP	Personal Continuity	High		0.87
	PCON	Applications Experience	High		0.91
	APEX	Applications Experience	Very High		0.95
	PLEX	Platform Experience	Nominal		1.00
	LTEX	Language and Tool Experience	Nominal		1.00
Project Factors:					
	TOOL	Use of Software Tools	Nominal		1.00
	SITE	Multistate Development Site Collocation	Nominal		1.00
	SCED	Required Development Schedule	Nominal		1.00
			Product of the Effort Multipliers		**0.77**

Combined Effort Multiplier = 0.77

Exhibit 4
AlphaMed Company
Cost Approach
Replacement Cost New less Depreciation Method
Computer Software Valuation Summary
As of January 1, 2016

Software Program	Total Physical LOC	Physical Executable LOC [a]	Logical Executable LOC [b]	COCOMO II Effort in Person-Months [c]	SLIM Effort in Person-Months [d]	Method Average Effort in Person-Months	Obsolescence Adjustment [e]	Adjusted Effort in Person-Months [f]
Program 1	155,000	131,750	98,813	302.25	232.73	267.49	0%	267.49
Program 2	75,000	63,750	47,813	139.39	160.30	149.84	100%	-
Program 3	160,000	136,000	102,000	312.66	343.92	328.29	10%	295.46
Program 4	180,000	153,000	114,750	354.49	177.25	265.87	25%	199.40
Total	570,000	484,500	363,375	1,108.79	914.20	1,011.50		762.36

Times: Blended Development Cost per Person-Month [g]	$ 8,600
Equals: Development Cost (net of obsolescence)	6,556,280
Add: Developer's Profit (10 percent) [h]	655,628
Equals: Total Development Cost with Developer's Profit	7,211,908
Add: Entrepreneurial Incentive (15 percent) [h]	1,081,786
Indicated Value of Subject Computer Software (rounded)	**$ 8,290,000**

LOC = Lines of code
[a] The analyst used a source to executable line-of-code reduction percentage of 15 percent.
[b] The analyst used a physical to logical line-of-code reduction percentage of 25 percent.
[c] Based on coefficient a = 2.94, scaling exponent b as presented on Exhibit 2, and effort multiplier as presented in Exhibit 3.
[d] Derived by the analyst using a SLIM valuation tool (details not presented).
[e] An obsolescence adjustment was applied by the analyst for programs that have been scheduled for replacement/update or retirement based on the RUL and age of each of the programs.
[f] Calculated as the average effort in person-months multiplied by the obsolescence adjustment.
[g] Calculated as a blended rate based on the full absorption cost of employees and contractors involved in development.
[h] Analyst estimate.

Exhibit 5
AlphaMed Company
Market Approach
Relief from Royalty Method
Computer Software Valuation Summary
As of January 1, 2016

	Year 1	Year 2	Year 3	Year 4	Year 5
Software-Dependent Sales of Diagnostic Services	$ 45,000,000	$ 47,250,000	$ 49,612,500	$ 52,093,125	$ 54,697,781
Multiplied by: Royalty Rate	8.0%	8.0%	8.0%	8.0%	8.0%
Equals: Gross Royalty Savings	3,600,000	3,780,000	3,969,000	4,167,450	4,375,823
Less: Income Tax (at 40%)	(1,440,000)	(1,512,000)	(1,587,600)	(1,666,980)	(1,750,329)
Equals: Net Royalty Savings	2,160,000	2,268,000	2,381,400	2,500,470	2,625,494
Periods Discounted	0.5	1.5	2.5	3.5	4.5
Multiplied by: Present Value Interest Factor (at 15%)	0.933	0.811	0.705	0.613	0.533
Equals: Present Value of Net Royalty Savings	$ 2,015,280	$ 1,839,348	$ 1,678,887	$ 1,532,788	$ 1,399,388
Indicated Value of Subject Computer Software (rounded)	**$ 8,470,000**				

Exhibit 6
AlphaMed Company
Market Approach
Market Transaction Method
Computer Software Valuation Summary
As of January 1, 2016

Valuation Variables	Number of LOC	Sale Transaction Price	Sale Transaction Price per LOC
Comparable Software Sale/Licensing Transaction 1	408,700	$ 7,560,950	$ 18.50
Comparable Software Sale/Licensing Transaction 2	587,020	8,394,386	14.30
Comparable Software Sale/Licensing Transaction 3	362,892	4,572,439	12.60

Valuation Analysis	Low End of Indicated Value Range	High End of Indicated Value Range
Subject Computer Software Total Number of LOC	570,000	570,000
Multiplied by: Market-Derived Price per LOC	$ 12.60	$ 18.50
Equals: Indicated Value of Subject Computer Software	$ 7,182,000	$ 10,545,000
Indicated Value of Subject Computer Software (rounded) [a]		**$ 8,860,000**

LOC = Line(s) of code
Note:
[a] Based on the average of the low and high end ranges.

Valuing a Trained and Assembled Workforce

Michael A. Harter, PhD, and Justin M. Nielsen

Understanding the process of valuing a taxpayer company trained and assembled workforce may be important for ad valorem property taxation. This is because many taxing jurisdictions exclude the value of intangible personal property from the taxpayer's taxable property base. And, an assembled workforce is an intangible personal property that is common to many taxpayer companies

Introduction

Within ad valorem property taxation, a conflict may arise between an industrial or commercial taxpayer corporation (or other types of taxpayer entity) and the taxing authorities with regard to the value of the taxpayer intangible assets. This is because many taxing jurisdictions exclude the value of intangible personal property from the taxpayer's taxable property tax base.

Taxpayers that own property in such jurisdictions have a motivation to recognize the value of their intangible assets and, specifically, the assembled workforce.

The assembled workforce typically falls into a category of intangible assets referred to as "human capital intangible assets." This category also includes the following intangible assets:

1. Contractual agreements with current or former employees, such as employment contracts
2. "Personality" or other entertainment industry contracts
3. Sports player contracts
4. Covenants not to compete and other individual (noninstitutional) noncompete agreements[1]

While all human capital intangible assets can possess measurable value, this discussion only explores the valuation of a typical assembled workforce intangible asset.

The cost approach is often used to estimate the value of an assembled workforce.

This discussion presents the valuation of an assembled workforce using the cost approach, including a brief discussion of the information gathering process and obsolescence considerations.

Valuation of Human Capital Intangible Assets

Certain human capital intangible assets qualify as intellectual property. As presented in *Guide to Property Tax Valuation*, the most common type of human capital intangible asset is the assembled workforce.[2]

The assembled workforce represents the taxpayer's overall expectation that experienced employees will report to work each business day. The taxpayer, as the employer, also expects that the experienced employees:

1. are trained in how to perform their duties and responsibilities,
2. know how to operate any equipment for which they are responsible,
3. are knowledgeable about the goals and protocols of the taxpayer organization, and

4. are experienced working with, and communicating with, each other.[3]

The human capital intangible assets may also include contract-related intangible assets. Contract-related intangible assets include employment agreements, sports or entertainment contracts, and noncompete agreements.

These intangible assets possesses measurable value because they give the taxpayer the right to:

1. receive some benefit in the future (such as for the employment of a professional or athlete) or
2. avoid some problem in the future (such as for competition from a former taxpayer corporation employee).[4]

For this discussion, we will focus on non-contract-related intangible assets, specifically the valuation of an assembled workforce.

Valuation of the Assembled Workforce

In aggregate, the taxpayer employees are often referred to as an assembled workforce. However, the assembled workforce intangible asset has more measurable value than a certain number of employees showing up for work each day at the owner/operator's facility.

The characteristics of an assembled workforce intangible asset include the following:

1. Expectation of employment services. This refers to the taxpayer expectation that employees will report for work and be prepared to perform their respective responsibilities. The taxpayer does not expect to have to locate and train new employees, and the employees do not expect to have to constantly find a new job.
2. Expectation of efficient and effective operations. Not only does the taxpayer expect employees to show up to work, but the taxpayer also expects that the employees (a) know how to do their job well, (b) know the organization's systems and procedures, and (c) know how to work together effectively.

   Importantly, this intangible asset is not just an assembled workforce, but as presented above, is a *trained* and assembled workforce.
3. Information about all employees' experience and expertise. This refers to all the information the taxpayer knows about an employee, most of which is documented in employment files and records.

   For example, the taxpayer knows all the initial and continuing education training for each employee.
4. Information about all employees' compensation and benefits. This information for each employee may include historical salary, rates of salary increase, promotions, bonuses, and other performance indicators.
5. Information about all employees' taxation and other administrative issues.

   Generally, employers need information about employees to comply with various employment filing requirements including the Federal Insurance Contributions Act, Federal Unemployment Tax Act, State Unemployment Tax Act, and other required employment-related taxes.

   Employers also need information to comply with federal and state employer reporting requirements.[5]

As a result of the inherent characteristics presented above, an assembled workforce has measurable value according to several relevant judicial decisions.

For example, in the judicial decision *Burlington Northern Railroad Co. v. Bair*, an ad valorem property tax case involving Burlington Northern Railroad, a federal district court allowed an ad valorem tax exemption with regard to the value of the railroad's assembled workforce intangible asset.[6]

This ruling allowed for a reduction in the value of the overall taxable unit value, or business enterprise value, by the estimated value of the assembled workforce.

Clearly, a taxpayer assembled workforce has fundamental value. However, it is the job of the valuation analyst to use objective and replicable intangible asset approaches, methods, and procedures in order to quantify the assembled workforce value within an ad valorem property tax context.

As such, the initial task of the analyst is to gather the data and information necessary to perform a valuation of an assembled workforce.

Data Collection and Information Gathering

In estimating the value of a assembled workforce, the first step in the valuation process is to collect the data and information necessary to complete the valuation.

The analyst should identify, gather, confirm (through due diligence interviews with relevant company management), and analyze the data and information provided by the taxpayer with regard to the intangible asset.

The data and information typically required to complete a workforce valuation includes the following:

1. Total number of company personnel (i.e., total employees)
2. Base salary of company personnel
3. Bonus/incentive/commission of company personnel
4. Payroll taxes and benefits expense attributable to company personnel (which often may be a percentage of base salary for company personnel and can be referred to as "the full absorption overhead allocation rate")
5. Tenure of company personnel
6. Weeks of on-going training of company personnel on an annual basis
7. Weeks of new-hire training of company personnel
8. Employee recruiting and hiring costs of company personnel
9. Annual turnover or retirement of company personnel
10. Length of time from initial hire until company personnel is fully proficient

Depending on the size of a company's workforce, it may be appropriate for personnel to be grouped by department, function, or experience (i.e., sales, finance, legal, information technology, executive management, etc.). This allows the analyst to obtain and organize data where larger groups of individuals share similar characteristics and comparative value.

Once the analyst has obtained and analyzed the assembled workforce-specific data and information discussed above, the next step involves applying generally accepted valuation approaches and methods, and specifically the cost approach—replacement cost new less depreciation (RCNLD) method, in order to estimate the value of the assembled workforce.

Assembled Workforce Valuation Methods

Similar to estimating the value of other intangible assets, there are three generally accepted approaches for valuing human capital intangible assets, such as a workforce. The individual valuation methods are incorporated within the following three generally accepted approaches:

1. The market approach
2. The income approach
3. The cost approach

Market Approach

The market approach is founded on the related economic principles of competition and equilibrium. These economic principles indicate that in a free and unrestricted market, supply and demand factors will adjust the price of an intangible asset to a point of equilibrium.

The principle of substitution also influences the market approach to valuing an intangible asset. This is because analysis of equilibrium prices for substitute intangible assets will provide meaningful evidence with regard to the indicated value of the intangible asset.

The market approach often has limitations when used to estimate the value of an assembled workforce, largely due to the lack of an "assembled workforce market," or the economic environment where arm's-length transactions of similar intangible assets

occur between unrelated parties. As such, the market approach is less commonly used than other valuation approaches in the workforce valuation.

Income Approach

The income approach is founded on the principle of expectation of future income. In this approach, the value of an intangible asset is calculated as the present value of the expected future economic income derived from the "ownership" of the intangible asset.

Within the income approach, the owner/operator anticipates the expected economic income to be earned from the intangible asset. The expectation of future economic income is then converted to a present value—or an indicated value of the intangible asset.

In calculating the present value, the analyst estimates the taxpayer required rate of return on the intangible asset generating the prospective economic income. This estimated rate of return is then applied to the expectation of future economic income attributable to the intangible asset in order to arrive at an indicated value.

Typically, the rate of return of the intangible asset will be a function of several economic variables, including the risk or uncertainty associated with the expected future economic income of the intangible asset.

However, the income approach may be used less often to estimate the value of an assembled workforce. This is because it may be difficult to approximate the economic income that would be generated by each specific taxpayer employee.

Cost Approach

The cost approach is founded on the economic principle of substitution. The substitution principle indicates that an owner/operator will pay no more for a fungible intangible asset than the cost to obtain an intangible asset of equal utility (i.e., obtain through either purchase or construct).

The availability, and associated cost, of a substitute intangible asset, such as a assembled workforce, is directly affected by changes in the supply and demand functions with regard to the universe of substitute intangible assets.

While the analyst should consider all intangible asset valuation approaches, this discussion focuses on the application of the cost approach in estimating the value of a workforce. The cost approach is commonly used to value a workforce.

This is likely due to the relevance of the principle of substitution presented above, as the analyst is

estimating the value of the assembled workforce for its current owner (i.e., under the premise of value in continued use). In other words, if the owner did not have the in-use assembled workforce, the owner would then have to create a substitute assembled workforce in its place. Therefore, the owner would have to pay (i.e., expend costs) to create the workforce intangible asset.

The cost approach is also often used to value an assembled workforce because of the difficulties in applying both the market approach and the income approach to value a workforce.

Cost Approach Valuation Methods

In applying the cost approach, there are several methods that can be applied. These cost approach methods include:

1. reproduction cost new less depreciation (RPCNLD) method and
2. replacement cost new less depreciation (RCNLD) method.

These cost approach methods are discussed below.

Reproduction Cost New less Depreciation Method

Reproduction cost new considers the construction of an exact replica of the subject intangible asset.

Reproduction cost new is the total cost, at current prices, to construct an exact duplicate or replica of the subject intangible asset. The duplicate intangible asset would be created using the same materials, standards, design, layout, and quality of workmanship used to create the original intangible asset.

In the case of an assembled workforce, reproduction cost new estimates the current cost to create an exact duplicate of the taxpayer workforce.

Reproduction cost new considers:

1. the same number of employees of the subject assembled workforce and
2. employees with exactly the same levels of experience, expertise, and education as the subject assembled workforce.

One method that may be used to estimate reproduction cost new is to restate the actual historical development costs of the assembled workforce in terms of current dollars. This procedure provides an estimate of the costs that would be incurred to reproduce the subject workforce.

This procedure is particularly applicable if the company maintains detailed accounting information with regard to the historical costs incurred to recruit, hire, and train the current workforce since each employee was hired.

Replacement Cost New

Replacement cost new considers the cost to recreate the functionality or utility of the intangible asset. In form or appearance, the replacement intangible asset may be quite different from the subject intangible asset. However, similar to reproduction cost new, replacement cost new is based on current (i.e., valuation date) costs.

A replacement-cost-new-based valuation method analysis considers the efficiency and effectiveness of the subject workforce—not the quantity and quality of the workforce. While the replacement workforce performs the same task as the subject workforce, the replacement workforce many times is superior in some way when compared to the subject workforce.

As such, while the replacement analysis attempts to replace the efficiency and effectiveness of the subject workforce, the replacement workforce many times may provide more utility than the subject workforce. If this is in fact the case, the analyst should consider this increased utility by potentially incorporating an obsolescence adjustment in the replacement cost analysis.

To the extent that a subject intangible asset is less useful than an ideal replacement asset, it may be appropriate to adjust the subject intangible asset cost.

As such, the cost of the replacement asset may be adjusted for losses in value due to:

1. physical depreciation,
2. functional obsolescence, and
3. external (and particularly economic) obsolescence.

Each of these types of obsolescence associated with the replacement analysis are presented later in this discussion.

Understanding the difference between reproduction cost new (RPCN) and replacement cost new (RCN) is important when applying the cost approach. Next, we discuss the RCNLD method.

Replacement Cost New less Depreciation

RCN estimates the cost to recreate the functionality of a assembled workforce. RCN is based on costs as of the valuation date. However, an RCN analysis attempts to replace the efficiency and effectiveness of the subject assembled workforce, but not the quantity and quality of the assembled workforce.

In an RCN analysis, the hypothetical assembled workforce may differ significantly from the actual workforce. For example, the hypothetical workforce may have fewer—but more qualified—employees. The expected production of the replacement workforce would be the same as the current workforce, but the composition (number, age, experience, education, etc.) of the replacement workforce could be quite different from the current workforce.

In other words, while the replacement workforce performs the same task as the subject workforce, the replacement workforce is often superior in some way compared to the subject workforce.

To the extent that an intangible asset is less useful than an ideal replacement asset, the subject intangible asset may require an adjustment. The RCN may be adjusted for losses in value due to:

1. physical depreciation,
2. functional obsolescence,
3. technological obsolescence, and
4. economic obsolescence.

As discussed, the replacement cost of an intangible asset is the total cost to create, at current prices, an asset having equal utility to the subject intangible asset. Importantly, the replacement intangible asset would be created using modern methods and assembled according to current standards.

Therefore, the replacement intangible asset may have greater utility than the subject intangible asset.

When applying the RCNLD method, the analyst needs to consider the recruiting and hiring costs discussed previously (i.e., the RCNLD method is the RCN method, adjusted for appropriate depreciation).

In the RCNLD method, the estimated costs to recruit, hire, and train are expressed as a percentage of total compensation for employees. Depending on discussions with management and how the company identifies its employees internally, often times it may be appropriate to separate the costs to recruit, hire, and train employees by their employee department, level, function, or years of experience.

The estimated costs to recruit, hire, and train are then multiplied by the historical total compensation for the different employee levels, which results in an estimated workforce value.

The formula for estimating the intangible asset value using the RCNLD method is:

$$RCN - PD - FTO - EO = Value$$

where:

RCN = Replacement cost new
PD = Physical depreciation
FTO = Incurable functional and technological obsolescence
EO = Economic obsolescence

The RCNLD formula assumes that any curable functional or technological obsolescence has been removed from the replacement workforce. Identifying and removing all forms of obsolescence is important because the RCNLD should represent the ideal collection of replacement employees.

In other words, identifying and removing all forms of obsolescence from the RCN indicates the current value of the workforce. Three common types of obsolescence used in the RCNLD method are discussed below.

Types of Obsolescence

In applying the RCNLD method, the analyst should consider an adjustment for certain types of obsolescence.

Physical Depreciation

Physical depreciation represents the reduction in value of an asset due to physical wear and tear resulting from continued use. While an intangible asset does not typically experience physical depreciation, it is possible for an assembled workforce to experience physical depreciation. The analyst should consider this concept in a RCNLD method analysis.

For example, the functionality of the subject workforce may be recreated by a replacement workforce composed of employees with lesser years of experience. While the replacement assembled workforce are therefore compensated less due to fewer years of service, they still possess the same skill set required to perform the job requirements of the subject workforce.

When the analyst is presented with this situation, the analyst should consider a reduction to the estimated value of the subject workforce related to the additional costs not incurred by recreating the functionality of the subject workforce with a "lower cost" replacement.

In other words, the value of the subject workforce may appropriately be decreased as the cost to replace the subject workforce does not require the recreation of the additional subject employee experience (and associated additional compensation costs).

Functional Obsolescence

Functional obsolescence is the reduction in the value of an asset due to its inability to perform the function for which it was originally designed.

For purposes of a workforce intangible asset, functional obsolescence is relevant when a company has more employees on the payroll than would be necessary to operate the ideal replacement workforce.

The existence of too many employees could be attributed to labor work rules, managerial procedures, collective bargaining agreements, or if employees are unable to report to work but are still on the payroll. Importantly, unlike physical depreciation, functional obsolescence cannot necessarily be seen by the analyst.

Technological obsolescence, a form of functional obsolescence, indicates that the underlying function of a subject intangible asset has become obsolete to some degree. The subject intangible asset still performs the tasks it was originally created for, however a replacement intangible asset would likely perform the tasks in an improved, or more efficient manner.

It is important to note that the analyst should recognize the distinctions and not erroneously double count functional obsolescence and technological obsolescence.

Economic Obsolescence

Economic obsolescence is a decrease in value due to the effects, events, or conditions that are external to—and not controlled by—the subject intangible asset's current use or condition. The existence of economic obsolescence can be identified by analyzing whether the subject intangible asset can generate a fair rate of return to the owner based on an unadjusted value indication.

If the intangible asset can generate an adequate rate of return over its expected remaining useful life (RUL), which is the duration by which the intangible asset will be useful to a business, then there is no economic obsolescence. If the intangible asset cannot generate an adequate rate of return based on this unadjusted value indication, then economic obsolescence exists.

Additional Cost Components Consideration

In estimating the value of a subject workforce, the RCNLD method should also consider additional relevant direct costs and indirect costs. After calculating the result using the RCNLD formula presented above, the analyst should take into consideration the motivation and potential profitability required by the intangible asset developer.

The RCNLD method used to estimate the value of a subject workforce should, therefore, consider the following additional costs:

1. The workforce developer's profit, which is the expected profit margin on the direct and indirect costs of investment. For example, a company owner of an intangible asset developer expects to earn a reasonable profit on the direct and indirect costs associated with the creation of the intangible asset.
2. The workforce developer's entrepreneurial incentive, which is the fair rate of return on the time and money investment in the workforce to economically motive the development process.

These costs are important to consider because the developer of an intangible asset expects a return of all of the direct and indirect costs related to the development of the intangible asset. Without an expected return, there is no incentive for a taxpayer to develop an intangible asset.

The following simplified example demonstrates how these methods may be applied.

Assembled Workforce Illustrative Valuation Example

This example uses the concepts and information discussed previously to value the workforce of Alpha Company as of January 1, 2016.

The purpose of the analysis is to provide an independent opinion to assist Alpha management with its ad valorem property tax assessment. Exhibits 1 through 4 present a simplified example of the valuation of Alpha workforce.

In this example, the value of the Alpha workforce is estimated using the RCNLD method. As presented previously, in applying the RCNLD method, the valuation analyst should obtain the relevant subject workforce data, including the cost to recruit, hire, and train new employees of comparable experience as the actual Alpha employees.

In this example, we estimated these costs as a percent of total compensation for employees based on their years of service.

As their years of service increase, the compensation level of Alpha employees increases as presented in Exhibit 1.

As presented in Exhibit 1, the specific component costs associated with the subject workforce should be identified. These costs include employee base compensation, the total cost of employee benefits (including fringe benefits and payroll taxes),

Exhibit 1
Alpha Company
Fair Market Value of the Assembled Workforce
Current Employee Compensation Data
As of January 1, 2016

Years of Service	Total Number of Employees	Employee Base Compensation	Cost of Employee Benefits	Bonuses and Additional Compensation	Total Direct and Indirect Compensation	Average Total Compensation per Employee
0-5	50	$ 1,500,000	$ 375,000	$ -	$ 1,875,000	$ 37,500
6-10	150	6,000,000	1,500,000	150,000	7,650,000	51,000
11-15	200	10,000,000	2,500,000	200,000	12,700,000	63,500
15-20	250	17,500,000	4,375,000	250,000	22,125,000	88,500
20+	300	27,000,000	6,750,000	300,000	34,050,000	113,500
Totals	950	$62,000,000	$15,500,000	$900,000	$78,400,000	$70,800

overhead costs such as rent, and any bonuses and additional compensation. The total direct and indirect compensation and average total compensation per employee may then be calculated as presented in Exhibit 1.

Exhibit 2 presents the expected costs to recruit, hire, and train employees categorized by years of service. The replacement costs are derived from discussions with Alpha management, who estimated these expenses for employees based on their years of service.

To quantify the total expenses associated with recruiting, hiring, and training, the analyst may calculate these costs as a percent of total compensation as presented in Exhibit 2.

To assess whether the employee costs provided by management are reasonable, the analyst may compare whether the estimated costs are in line with historical costs.

After quantifying the total costs associated with each phase of the recruiting, hiring, and training process, a comparison can be made between:

1. the expected recruiting, hiring, and training cost and
2. the total amount of employee compensation paid.

This comparison results in a ratio (or percentage of compensation) which may be used in the analysis.

Exhibit 3 calculates the RCN of the Alpha workforce before making any reductions for depreciation or obsolescence. The RCN of the workforce is estimated by multiplying (1) the total expected cost to recruit, hire, and train replacement employees by (2) the total compensation paid to employees of varying years of service.

Based on the estimated costs, the indicated direct and indirect cost related to Alpha workforce, as of January 1, 2016, is $31.7 million (rounded).

After considering developer's profit and entrepreneurial incentive, the total RCN of the Alpha workforce, as of January 1, 2016, is $36.4 million (rounded).

Exhibit 4 estimates the Alpha workforce RCNLD. The RCNLD takes into consideration physical depreciation, functional obsolescence, and technological obsolescence.

Exhibit 2
Alpha Company
Estimated Cost to Recruit, Hire, and Train Replacement Employees
As of January 1, 2016

Employee Years of Service	Estimated Cost to Recruit	Estimated Cost to Hire	Estimated Cost to Train	Total Estimated Cost to Recruit, Hire, and Train Replacement Employees
0-5	2.5%	5.0%	20.0%	27.5%
6-10	2.5%	5.0%	25.0%	32.5%
11-15	2.5%	5.0%	25.0%	32.5%
15-20	3.5%	5.0%	30.0%	38.5%
20+	4.0%	8.0%	35.0%	47.0%

Exhibit 3
Alpha Company
Fair Market Value of the Assembled Workforce
Summary of Current Compensation Data and
Costs to Recruit, Hire, and Train Replacement Employees
As of January 1, 2016

Employee Years of Service	Total Direct and Indirect Compensation	Total Cost to Recruit, Hire, and Train Replacement Employees	Replacement Cost New of the Assembled Workforce
0-5	$1,875,000	28%	$515,625
6-10	7,650,000	33%	2,486,250
11-15	12,700,000	33%	4,127,500
15-20	22,125,000	39%	8,518,125
20+	34,050,000	47%	16,003,500
	78,400,000		
Direct and indirect cost component of the assembled workforce			31,651,000
Plus: Developer's profit (based on industry average 10% profit margin × direct and indirect cost of $31,651,000)			3,165,100
Plus: Entrepreneurial incentive based on (1) 10% cost of capital, (2) estimated 1-year workforce replacement period, and (3) an average direct and indirect replacemnt cost investment of $15.8 million (i.e., $31,651,000/2) through the one-year assemblage period (i.e., $15.8 million × 10% = $1,582,550)			1,582,550
Equals: Replacement cost new (rounded)			**$36,400,000**

The amount of physical depreciation is based on the recognition that the ideal replacement workforce likely would have a different composition than the current workforce of 750 employees. Based on due diligence involving conversations with management, the 750 employees with over 11 years of experience were assumed to be replaced with employees that had 6 to 10 years of experience.

In other words, the additional costs associated with the recruiting, hiring, and training the 750 employees with over 11 years of experience would represent a form of physical depreciation (i.e., the replacement workforce would not cost as much to create as the subject workforce due to lower costs to recruit, hire, and train the replacement employees.)

As presented in Exhibit 4, we also estimated the functional obsolescence associated with Alpha workforce. As discussed, functional obsolescence is present when a company has an excess number of employees compared to its estimated ideal replacement workforce.

To estimate the amount of functional obsolescence in a workforce, the analyst may (1) estimate the percentage of the total workforce that is superadequate and (2) apply the percentage to the RCNLD.

In most instances, management should recognize whether the company's workforce requirements are met and whether the company has excess employees. Management can typically provide:

1. information on constraints in the production process and the required level of employees to address those constraints and
2. an understanding of company staffing issues resulting from labor agreements.

In this example, we estimated that 2 percent of Alpha employees were above the necessary workforce requirements ("excess employees"). The functional/technological obsolescence adjustment of the excess employees is estimated to be $479,375. It is subtracted from the RCNLD to arrive at an Alpha workforce fair market value of $23.5 million (rounded).

Conclusion

Understanding the process of valuing a workforce is important for ad valorem property taxation. This is because many states exclude the value of intangible assets from the property base.

This discussion described a process of valuing an assembled workforce by:

1. presenting the data gathering process appropriate to complete a valuation of a workforce,
2. describing various generally accepted cost approach methods used to value a workforce,
3. identifying and discussing certain obsolescence adjustments that should be considered by the analyst in estimating the value of a workforce using the cost approach, and
4. providing a simplified example of a workforce valuation.

In applying the cost approach, and specifically the RCNLD method, the analyst should identify, gather, confirm (through due diligence interviews with relevant taxpayer management), and analyze the data and information with regard to the workforce intangible asset.

Further, in estimating the value of a workforce, the analyst should consider (1) the potential obsolescence adjustments relevant to the subject workforce and (2) other cost considerations associated with the subject workforce such as the developer's profit and entrepreneurial incentive.

Notes:

1. Robert F. Reilly and Robert P. Schweihs, *Guide to Property Tax Valuation* (Chicago, Illinois: Willamette Management Associates, 2008), 427.
2. Ibid., 428
3. Ibid.
4. Ibid. Another type of a contract-related human capital intangible asset is a professional license, such as a license to practice accountancy, law, medicine, dentistry, and other various professions. Generally, these type of contract-related human capital intangible assets (1) are assigned to specific individuals, (2) are issued by a government or other regulatory agency, (3) are obtained by demonstrating specific professional competencies, and (4) generally increase the earning capacity of the licensee.
5. Robert F. Reilly and Robert P. Schweihs, *Guide to Intangible Asset Valuation* (New York: American Institute of Certified Public Accountants, 2014), 629.
6. Burlington Northern R.R. Co. v. Bair, 815 F.Supp. 1223 (S.D. Iowa, 1993) aff'd 60 F.3d 410 (8th Cir. 1995).

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Exhibit 4
Alpha Company
Fair Market Value of the Assembled Workforce
Replacement Cost New less Depreciation Method
As of January 1, 2016

Replacement Cost New (RCN)	$36,400,000
Less: Functional Obsolescence	
(equals the RCN of all 750 employees with over 11 years of experience when compared to the RCN of the same 750 employees if they were in the 6-10 years of service category)	12,431,250
Equals: Replacement Cost New less Functional Obsolescence	23,968,750
Less: Functional/technological obsolescence based on 2 percent excess number of current employees (i.e., $23,968,750 × 2% excess workforce = $479,375)	479,375
Equals: Replacement Cost New less Depreciation (RCNLD)	$23,489,375
Indicated Fair Market Value of the Assembled Workforce (rounded)	**$23,490,000**

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We have recently redesigned and updated our website to make it mobile-friendly. Please visit us at ***www.willamette.com*** *to view* Insights *issues, read articles and presentations from our professional staff, and learn about the variety of valuation, forensic analysis, and financial advisory services we offer.*

Recent Articles and Presentations

Robert F. Reilly, a managing director of our firm, wrote an article that was published in the March/April 2016 issue of *Construction Accounting and Taxation*. The title of Robert's article is "Selling Employee/Shareholder Transition Period Payments after the Construction Company Acquisition."

There has been considerable consolidation in the construction industry during the last several years. In the acquisition of a construction company, it is common for the company buyers to request that any individual employee/shareholder seller agree to continue to work for the acquired construction company during a specified transition period. Issues may arise as to how these selling employee/shareholders should be compensated. Robert's article discusses the structuring of transition payments, factors to consider when characterizing the transition payments, and legal precedent for the characterization of transition period payments.

Fady F. Bebawy, a vice president of our firm in our Chicago office, authored an article that appeared in the January 2016 issue of *Trusts & Estates*. The title of Fady's article is "The Five Marketability Forces Framework: An Approach to Business Valuations of Noncontrolling Interests in Privately Held Companies."

Disputes that arise from the audit of gift tax returns often involve the selection of the discount for lack of marketability (DLOM). Fady discusses customizing the selection of the DLOM. One tool that may be used is a variation of the Michael Porter's "Five Forces." The five forces that may be used in selecting an appropriate DLOM are supply, demand, substitutes, turnover, and competition. Fady discusses each of these forces as they relate to the DLOM.

Robert F. Reilly authored an article that was published in the Winter 2016 issue of *The Practical Tax Lawyer*. The title of Robert's article is "What Lawyers Need to Know about Distinguishing Personal Goodwill from Entity Goodwill in the Closely Held Company Valuation."

In many tax-related valuations, it is often important for the closely held business owners and their advisers to allocate the total enterprise value between the company-owned entity goodwill and the individual shareholder/employee's personal goodwill. Robert's article summarizes what counsel need to know with regard to the elements of, the separability of, and the documentation of a shareholder/employee's personal goodwill. This article also discusses a recent Tax Court decision: *Bross Trucking v. Commissioner*.

These and many other articles and presentations may be found on our website. Please visit us today.

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Communiqué

In Print

Robert Reilly, firm managing director, authored two articles that were published in the March/April 2016 issue of the *Pennsylvania Family Lawyer*.

Robert's first article was "Distinguishing Personal Goodwill from Entity Goodwill in the Valuation of a Closely Held Corporation." Robert's second article was "Closely Held Business Goodwill Valuation Approaches and Methods."

Robert Reilly also authored an article that was published in the March/April 2016 issue of *Construction Accounting and Taxation*. The title of Robert's article was "Selling Employee/Shareholder Transition Period Payments after the Construction Company Acquisition."

Robert Reilly also authored an article that was published in the Winter 2016 issue of the *Practical Tax Lawyer*. The title of Robert's article was "What Lawyers Need to Know about Distinguishing Personal Goodwill from Entity Goodwill in the Closely Held Company Valuation."

Robert Reilly also authored a two-part article that was published in *Financial Valuation and Litigation Expert* (*FVLE*). The title of Robert's two-part article was "Valuation of Health Care Entity Transactions." Part one appeared in the February/March 2016 *FVLE* issue, and part two appeared in the April/May 2016 *FVLE* issue.

Robert Reilly also authored an article that was published in the first quarter 2016 issue of the on-line publication *Transaction Advisors*. The title of Robert's article was "Distinguishing Personal Goodwill from Entity Goodwill in the Closely Held Company Acquisition.

Robert Reilly also authored an article that was published in the March/April 2016 issue of *Valuation Strategies*. The title of Robert's article was "Intangible Asset Valuation Process."

Robert Reilly also authored an article that was published in the January/February 2016 issue of *Construction Accounting and Taxation*. The title of Robert's article was "Distinguishing Personal Goodwill from Entity Goodwill in the Valuation of a Construction Company."

Robert Reilly also authored chapter 12 in the 2016 edition of the textbook *Intellectual Property Due Diligence in Corporate Transactions: Investment, Risk Assessment, Management*. The title of Robert's chapter is "Valuation of Intellectual Property Assets."

In Person

Robert Reilly will deliver three presentations to the Chartered Accountants of Australia and New Zealand on September 12 and 13, 2016, in Melbourne, Australia.

Robert will first deliver the keynote address. That presentation is entitled "The Benefits of Professional Standards for Chartered Accountant Valuation Specialists."

Robert's second presentation will be at the conference dinner. That presentation is entitled "If I Could Do It All Over Again (What Would I Change?)."

Robert's third presentation will be at a post-conference valuation specialist workshop. That presentation is entitled "Intangible Asset Valuation Approaches, Methods, and Procedures."

Kevin Zanni, a director in the Chicago office, will deliver a presentation at the National Association of Certified Valuators and Analysts (NACVA) Financial Consultants' Super Conference in Las Vegas on December 7, 2016. The topic of Kevin's presentation will be "A Step-by-Step Guide to Applying a Quantitative Method to Support the Discount for Lack of Marketability Selection."

Fady Bebawy, Chicago office vice president, delivered a presentation on April 16, 2016, at the ACTEC 2016 Ohio Fellows Meeting. The topic of Fady's presentation was "Valuation: Beyond the Basics—The Five Marketability Forces and the IRS Job Aid on S Corporations."

Weston Kirk, manager in the Atlanta office, delivered a presentation on March 5, 2016, in Atlanta, Georgia, at Georgia State University to the honors track in finance. The topic of Weston's presentation was "Business Valuation Approaches, Methods, and Analyses."

Insights Archives

❑ Spring 2016
Focus on Intellectual Property

❑ Spring 2015
Focus on Corporate Transaction Advisory Services

❑ Spring 2014
Focus on Property Tax Intangible Asset Valuation Analyses

❑ Winter 2016
Focus on Gift Tax, Estate Tax, and Generation-Skipping Transfer Tax Valuation

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