Thought Leadership Discussion

The Property-Specific Risk Premium and Unit Principle Property Appraisals

Connor J. Thurman and Robert F. Reilly, CPA

Analysts are often asked to appraise a taxpayer's industrial or commercial property for property tax compliance, appeal, or litigation purposes. Often, analysts apply the summation valuation principle to appraise such industrial and commercial property. For complex properties that are physically, functionally, or economically integrated, analysts sometimes apply the unit valuation principle to appraise the industrial or commercial property. These analysts apply generally accepted unit principle property appraisal approaches and methods. Most of property appraisals involve the analyst's measurement of cost of capital. This cost of capital becomes the basis for the analyst's development of the applicable yield capitalization rate or direct capitalization rate. For most unit principle appraisals, the yield capitalization rate and direct capitalization rate include the analyst's estimate of a property-specific risk premium ("PSRP"). This discussion explains the reasons why the PSRP should be included in the various cost of capital measurement models. This discussion describes the qualitative factors that the analyst considers in the judgment-based PSRP estimate. This PSRP estimate is one component of what is often called "alpha" in the measurement of a property-specific cost of capital. This discussion also summarizes the market-derived, empirical data sources that the analyst may consider as a proxy—or benchmark—in the quantitative estimate of the PSRP. These empirical data sources do not directly measure the PSRP. That is because the PSRP is unique to the subject property. However, these empirical data sources provide general guidance to support the PSRP estimate. Finally, this discussion summarizes one procedure that impacts both the qualitative and quantitative assessment of the PSRP: the functional analysis of the taxpayer property.

Introduction

Ad valorem property taxation, by definition, is based on the value of the taxpayer's property. Valuation analysts ("analysts") apply generally accepted property appraisal approaches and methods to estimate the value of the taxpayer's property. This statement is true for analysts who work for tax assessment authorities and for analysts who work for property owners.

The three generally accepted property appraisal approaches are the income approach, the cost approach, and the market (or sales comparison) approach. Depending on the physical, functional, and economic attributes of the taxpayer's property, the property can be valued based on (1) the summation principle of property appraisal or (2) the unit principle of property appraisal.

Applying the summation valuation principle, each component of the property is valued separately. That is, each component of land, land improvements, buildings, and tangible personal property may be valued separately. Then, all of the individual component property values are "summed" to conclude the total value of the taxpayer's property.

In the application of the unit valuation principle, in contrast, a complex property may be valued collectively—in the aggregate—as a single "unit" of taxpayer property. That is, all components of the land, land improvements, buildings, and tangible personal property are valued as part of a total assemblage—or unit—of property.

This discussion focuses primarily on the unit principle of property appraisal. Analysts always consider—and frequently apply—the income approach in unit principle property appraisal. The generally accepted income approach property appraisal methods include the yield capitalization method (sometimes referred to as the discounted cash flow method) and the direct capitalization method.

All income approach appraisal methods typically include the application of either a yield capitalization rate (sometimes referred to as a discount rate) or a direct capitalization rate. Depending on the measure of income included in the unit principle appraisal, the corresponding discount rate or direct capitalization rate may be one of the following:

1. A weighted average cost of capital ("WACC")
2. A cost of equity capital ("K_e")
3. Some other opportunity cost or expected rate of return measurement

The measurement of the property-specific discount rate or capitalization rate is also relevant to the application of the cost approach and the market approach to property appraisal. The discount rate and capitalization rate may affect the measurement of economic obsolescence in the cost approach.

The relative discount rates and capitalization rates (between the subject property and the comparable properties) may affect the analyst's selection and application of market-derived valuation pricing multiples in the market approach.

When the K_e is one component of the appropriate discount rate or capitalization rate, there are several generally accepted models that the analyst may apply to measure the taxpayer unit K_e. Several of these models are summarized in this discussion.

One consideration of just about every K_e measurement model is a component related to investment-specific (or property-specific) risk. This property-specific risk component is called by many names in the valuation professional literature, including unsystematic risk, asymptomatic risk, nondiversifiable risk, nonsystematic risk, project-specific risk, residual risk, investment-specific risk, and company-specific risk.

In the valuation professional literature, this property-specific risk component is sometimes called alpha—or the remaining risk component that is not measured by the other K_e variables. Whatever name is applied to this risk component, it does relate to a nondiversifiable element of risk. This type of risk is one consideration in the analyst's selection of the discount rate or capitalization rate to be applied in the unit principle appraisal.

This discussion focuses on what is included in—or should be considered in—the analysis of this K_e alpha component (or property-specific risk component).

The Property Cost of Capital

The K_e is the expected rate of return that an equity investor expects on the capital invested in a particular investment. Equity investors expect to earn a certain return on investment in order to be attracted to that particular investment.

In economic terms, the K_e for a particular investment is the opportunity cost of capital. That is, the K_e is the opportunity cost to the investor—or the rate of return that the investor forgoes by not investing the same amount of funds in the next best alternative investment available at a comparable level of risk.

The K_e is a forward-looking expectation of investment return. The K_e is the rate of return that the investor expects to receive in the future on that investment.

The K_e incorporates the following expectations regarding the investment return:

- The "real" rate of return—The amount of return that an investor would expect to earn on a risk-free investment.
- The expected inflation rate—The anticipated depreciation in purchasing power while the investor's wealth is tied up in the particular investment (i.e., during the expected investment holding period).
- The risk-related return—The return component related to the uncertainty as to when and how much current period income—or capital appreciation—the investor will receive from the particular investment.

The K_e metric enables the investor to convert (or to discount) an estimate of expected future income to a present value. This present value procedure allows the investor to:

1. make informed pricing decisions with respect to the purchase or sale (whether real or hypothetical) of the subject property and
2. compare one investment opportunity to alternative investment opportunities.

There are several generally accepted K_e measurement models. Most of the K_e measurement models include the following components:

1. A risk-free rate of return ("R_f")
2. A general equity risk premium ("ERP")
3. An industry-related risk premium ("IRP")
4. A size-related risk premium ("S_p")
5. An unsystematic risk premium

This discussion generally refers to that unsystematic risk premium as the property-specific risk premium—or the "PSRP."

For the first four above-listed K_e components, there are generally accepted data sources that analysts can access to quantify that particular return component. For the fifth above-listed K_e component (i.e., the unsystematic risk premium), there is no single data source that analysts can access to specifically quantify that particular return component.

Of course, there is no data source available as a reference for the property-specific risk measurement. This is because, by definition, the property-specific risk is unique to the individual property.

There are numerous qualitative factors that analysts can consider, and there are several quantitative proxies that analysts can consider—to develop a supportable estimate for the fifth K_e component. Ultimately, the estimate of the unsystematic risk component of the private company K_e is a matter of the analyst's professional judgment.

For purposes of this discussion, the PSRP is referred to and explained in the context of the appraisal of the taxpayer's industrial or commercial property. That is, the consideration and estimation of a *property*-specific risk premium is discussed.

The S_p and the PSRP are sometimes referred to collectively as the "alpha" or "α" component of investment risk. Alpha is sometimes defined as the excess return on an investment above the rate of return that is predicted by the application of the capital asset pricing model ("CAPM").

The term alpha is often attributed to the academic research of Michael Jensen. Jensen taught finance at the University of Rochester between 1967 and 1988. During that time period, Jensen compared the rates of return actually earned on diversified investment portfolios to the rates of return that were predicted by the CAPM.

The formula for this comparison—or this measurement of what is often called "Jensen's alpha"—follows:

$$\alpha = R_i - [R_f + \beta \times (R_m - R_f)]$$

where:

α	=	Jensen's alpha
R_i	=	Actual rate of return on the investment
R_f	=	Risk-free rate of return
$(R_m - R_f)$	=	Long-term equity risk premium (measurement of the overall equity risk premium)
β	=	Industry beta

The investment portfolio's actual rate of return in excess of the CAPM-predicted rate of return may be positive, negative, or zero. The CAPM measures the risk-adjusted rates of return on investment securities (i.e., the CAPM accounts for the risk of the security). If the security is efficiently priced, then the actual return on investment will be same as the return on investment predicted by the CAPM.

The alpha in that case (i.e., the actual rate of return equals the expected rate of return) will be zero. If, however, the equity security actually earns a higher rate of return than the CAPM-predicted rate of return, then it will have a positive alpha. A negative alpha indicates that the portfolio actually did not earn its CAPM-predicted expected rate of return.

While capital markets are typically considered to be efficient (and, therefore, an alpha should theoretically not be observed in the actual application of the CAPM), Jensen noted that an alpha was actually observable—and measurable.

Cost of Equity Capital Measurement Models

Investors and finance professionals have developed numerous models for analyzing and measuring the K_e component of an investment in an industrial or commercial property.

These K_e measurement models include the following:

1. The dividend yield plus capital gain model (also called the discounted cash flow model or "DCF" model)
2. The arbitrage pricing theory (or "APT") model
3. The Fama-French multi-factor model
4. The CAPM
5. The modified capital asset pricing model (or "MCAPM")
6. The build-up model (or "BUM")
7. The Duff & Phelps risk premium report model (or "RPM")
8. The R_f plus risk premium model
9. The Gordon growth model
10. Many other models

The following discussion focuses on the application of the BUM, the CAPM, the MCAPM, and the RPM to measure the K_e for the purpose of appraising industrial or commercial property for property tax purposes.

This discussion of estimating the PSRP component applies to all of the above-listed K_e models. Due to space constraints, this discussion focuses primarily on the BUM, CAPM, MCAPM, and RPM. However, analysts should be aware that the PSRP (or unsystematic risk premium) is a consideration in just about every discount rate and capitalization rate measurement. And, the PSRP is a consideration in just about every unit principle property appraisal.

In each K_e measurement model, the R_f is the rate of return available on a security that the market generally regards as free from the risk of default. Additionally, the R_f serves as an inflation adjustment mechanism.[1]

Typically, analysts measure the R_f by reference to the 20-year U.S. Treasury bond. This is because the 20-year U.S. Treasury bond is often used as the empirical benchmark in the measurement of the general ERP.

In most K_e measurement models, the ERP is the incremental rate of return that the investor expects to receive as compensation for the risk of investing in equity investments (e.g., stocks) instead of investing in a risk-free asset. Conceptually, the ERP should be forward-looking. However, most data sources available to measure the ERP actually rely on historical market returns.

One proxy to measure the ERP for U.S. stocks is the Standard & Poor's ("S&P") 500 index. This index is based on the market capitalizations of 500 large companies with common stock listings on:

1. the New York Stock Exchange ("NYSE"),
2. the National Association of Securities Dealers Automated Quotations ("Nasdaq"), or
3. the CBOE BZX Exchange.

In many K_e measurement models, the ERP is typically calculated as follows:

$$ERP = R_m - R_f$$

where:

ERP = Equity risk premium
R_m = Expected rate of return on the stock market
R_f = Risk-free rate of return

Build-Up Model

The BUM is an additive model that incorporates the various risk factor components of the K_e, including (1) an R_f, (2) an ERP, (3) an IRP, (4) an S_p, and (5) a PSRP.

In the BUM, the K_e is typically calculated as follows:[2]

$$K_e = R_f + ERP + IRP + S_p + PSRP$$

where:

K_e = Cost of equity capital
R_f = Risk-free rate of return
ERP = Equity risk premium
IRP = Industry risk premium
S_p = Size-related risk premium
PSRP = Property-specific risk premium

Capital Asset Pricing Model

According to the textbook *Understanding Business Valuation*, the CAPM was "originally developed in the context of portfolio theory as a way to measure the risk an individual stock contributes to a well-diversified portfolio."[3]

Further, "CAPM has been modified to be used as a method of determining a discount rate, commonly used in the valuation of larger companies. It has little, if any, applicability to small- and medium-sized businesses. . . ."[4]

The basic CAPM formula does not include an alpha component. This is because the basic CAPM

is applicable to measure the expected rate of return of a perfectly liquid security within the context of a well-diversified portfolio of publicly traded (i.e., perfectly liquid) securities.

For that application, unsystematic risk can be diversified away. Accordingly, an investor who buys a perfectly liquid security within a well-diversified portfolio of publicly traded (i.e., perfectly liquid) securities would not expect to earn a PSRP.

In addition, the CAPM is based on a number of fundamental assumptions. Some of the fundamental assumptions underlying the development of—and the application of—the CAPM include the following:

- Financial markets are competitive and returns provide full range of investment opportunities.
- All investors plan to invest over the same time horizon.
- There are no distortionary income taxes or transaction costs.
- All investors can borrow and lend at the same risk-free rate.
- Investments are infinitely divisible.
- Investors can access all information and are equally well informed.
- The risk measure used remains constant (i.e., a nonvarying beta). That is, the market portfolio that is used to determine beta will consist of all publicly traded securities.
- The variance of returns is an adequate measurement of risk. That is, the CAPM assumes that investment rates of return will be normally distributed.

The above-listed fundamental assumptions of the CAPM typically do not apply in the typical industrial or commercial property appraisal. Further, the fundamental assumptions of the CAPM may not always apply when estimating the K_e of a single liquid security within well-diversified portfolio of publicly traded securities. Analysts know this because alpha is still able to be observed in the public capital markets.

The basic CAPM formula is presented below:[5]

$$K_e = R_f + \beta \times (R_m - R_f)$$

where:

K_e = Cost of equity capital
R_f = Risk-free rate of return
$(R_m - R_f)$ = Long-term equity risk premium (measurement of the overall equity risk premium)
β = Industry beta

Modified Capital Asset Pricing Model

The MCAPM measurement method expands the basic CAPM measurement method. The application of the MCAPM is appropriate for measuring the K_e that would be applicable to the taxpayer unit appraisal.

The MCAPM formula is presented below:[6]

$$K_e = R_f + \beta \times (R_m - R_f) + S_p + PSRP$$

where:

K_e = Cost of equity capital
R_f = Risk-free rate of return
$(R_m - R_f)$ = Long-term equity risk premium (measurement of the overall equity risk premium)
β = Industry beta
S_p = Size-related risk premium
PSRP = Property-specific risk premium (measurement of other risk factors)

Similar to the CAPM, in the application of the MCAPM, the long-term ERP is adjusted by an industry beta. Beta is a measure of the systematic risk (i.e., the systematic risk relative to the return measure of the overall equity market, such as the S&P 500 index) inherent in a company's investment return.

Published betas for publicly traded stocks typically reflect the capital structure of each respective public company. These betas are often referred to as levered betas, or betas that reflect the amount of the debt/equity leverage in the public company's capital structure.

Duff & Phelps Risk Premium Report Model

Duff & Phelps, LLC, annually publishes a measurement of the ERP based on the factors included in the "Risk Premium Report Study." The Risk Premium Report Study is primarily intended to be used in the development of K_e estimates for private companies:

1. that are financially healthy and
2. for which a "going-concern" premise of value is appropriate.

The Risk Premium Report Study develops its estimate of the ERP based on eight size factors.

The application of the Risk Premium Report Study to measure the K_e is often referred to as the RPM.

The RPM also includes data that may be used to estimate the ERP based on three risk factors. A detailed explanation of the size factors and the risk factors presented in the Risk Premium Report Study is beyond the scope of this discussion.

The RPM provides regression formulas that may be used to estimate the ERP, and the risk premiums are "smoothed" across 25 portfolios of different sized companies. To calculate the ERP, the analyst can apply the corresponding regression equation. Alternatively, analysts can select the portfolio that most closely resembles the size—or the risk characteristic fundamental—of the taxpayer unit.

Analysts rely on the subject investment (e.g., the subject property) operating fundamentals and the corresponding regression equation in order to estimate the ERP over the R_f for the investment. Analysts may include a PSRP component to the indicated ERP in order to measure the investment's K_e.

For example, let's assume that the analyst is valuing an illustrative taxpayer property (this example assumes a public utility property) as of June 2017. Let's assume that the subject property reports a historical five-year average net income of $0.7 million.

Applying the RPM regression formulas, the applicable regression equation variables are as follows:[7]

1. Constant of 14.722 percent
2. Coefficient of -2.565 percent

The calculation of the ERP over the R_f in this example is (1) 14.722 percent plus (2) -2.565 percent multiplied by (3) the common logarithm (or Log10) of $0.7 million. The resulting ERP over the R_f would equal 15.12 percent.

The RPM relies on an estimated ERP by Duff & Phelps in the calculation of the regression variables. Therefore, an ERP adjustment is needed. One frequently applied procedure for making this adjustment is to reconcile the difference between:

1. the ERP used in other K_e models (e.g., the MCAPM) and
2. the estimated ERP by Duff & Phelps used to calculate the regression variables.

Let's continue with the above example. Let's assume that:

1. the "ex post" ERP that the analyst relies on in the application of the MCAPM is equal to 6.94 percent and
2. the Duff & Phelps estimated ERP used in the regression variable calculation is 5.00 percent.

In this example, the RPM "ERP adjustment" would be 6.94 percent minus 5.00 percent, or 1.94 percent.

The estimated K_e in this example would be the (1) R_f (let's assume 2.60 percent) plus (2) the ERP of 15.12 percent plus (3) the ERP adjustment of 1.94 percent plus (4) the PSRP (let's assume 3 percent). Therefore, the estimated K_e would be 22.66 percent.

The MCAPM is one generally accepted model to measure the K_e for a unit principle valuation. In the application of the MCAPM, analysts should understand both the conceptual basis for—and the empirical data considered in the measurement of—the S_p and the PSRP (i.e., alpha).

To understand both the conceptual foundation and the empirical evidence for the development of the PSRP, it is important to understand the concepts of systematic risk and unsystematic risk.

Systematic Risk and Unsystematic Risk

In order to understand the importance of both the S_p and the PSRP in measuring the K_e for the appraisal of a subject property, it may be helpful to identify the differences between systematic risk and unsystematic risk.

According to the textbook *Valuing a Business*:[8]

> . . . *systematic risk* is the uncertainty of future returns resulting from the sensitivity of the return on the subject investment to movements in the return on the investment market as a whole. *Unsystematic risk* is a function of characteristics of the industry, the individual company, and the type of investment interest.

The basic CAPM assumes that the K_e risk premium component is a function of the investment's systematic risk only. One fundamental principle of the basic CAPM is that the investor expects a return on investment assuming that the investment is both (1) perfectly liquid and (2) part of a perfectly diversified portfolio of liquid investments.

In addition, another fundamental principle of the basic CAPM is that beta encompasses all the risk

inherent in the subject investment. Because unsystematic risk is associated with the characteristics of the individual investment, the CAPM does not incorporate an adjustment for PSRP.

However, MCAPM was developed as a method for measuring K_e for an investment that is either—or both—(1) not perfectly liquid and/or (2) not part of a perfectly diversified portfolio of liquid investments. In other words, MCAPM is applicable to the K_e measurement for the unit principle appraisal.

Unsystematic risk is incorporated in the MCAPM measurement of K_e by including the consideration of both S_p and PSRP (or, collectively, alpha).

Size-Related Risk Premium

In addition to the ERP, the MCAPM also incorporates consideration of an S_p (this S_p is sometimes also referred to as a small company risk premium). For a particular size of subject investment, the S_p represents the difference between (1) the actual historical excess return and (2) the excess return predicted by beta.

This "size effect" is based on the empirical observation that companies of smaller size are generally associated with greater investment risk and, therefore, have to provide a greater rate of return on investment in order to attract equity investors.

Property-Specific Risk Premium

The PSRP is the risk premium associated with the level of unsystematic risk inherent in a particular taxpayer unit. The PSRP can be positive or negative depending on the facts and circumstances of the taxpayer unit. The PSRP represents the additional risk premium required to compensate an equity investor for the uncertainty of investing in an industrial or commercial property.

Selection of a Property-Specific Risk Premium

In the professional literature related to investment analysis and portfolio management, "property-specific risk" is interchangeably referred to as "investment-specific risk," "company-specific risk," "nonsystematic risk," "unsystematic risk," "nondiversifiable risk," and "idiosyncratic risk."

This discussion sometimes uses the term "investment-specific risk." However, the term "property-specific risk" is frequently used in the valuation professional literature. Therefore, this discussion generally uses the term "property-specific risk."

Consideration of a Property-Specific Risk Premium

When estimating the discount rate or capitalization rate related to an investment, the PSRP is generally the last component applied when measuring the K_e. The PSRP is the component of risk that makes an investment (1) unique and (2) different from other benchmark investments that may be used to measure property capitalization rates, valuation pricing multiples, and/or other pricing metrics.

The inclusion of a PSRP in the K_e measurement is a generally accepted property appraisal procedure. However, a few issues make estimating a supportable level of property-specific risk difficult. The issues that can make the PSRP estimation difficult include risk (1) identification, (2) measurement, and (3) correlation with the appropriate incremental rate of return.

Because the PSRP is based on property-specific risk, there is no database, empirical study, measurement model, formula, or the like that can be applied to calculate a PSRP for an individual property investment. Therefore, while both qualitative analysis and quantitative empirical data proxies may be useful in the PSRP estimation, the PSRP measurement is ultimately a matter of the analyst's professional judgment.

In transactions involving industrial and commercial property, investors (or potential willing buyers) expect to be compensated for the assumption of property-specific risk. However, investors (or potential willing buyers) do not expect to be compensated for a PSRP in transactions where property-specific risk can be easily diversified away.

The CAPM was originally developed to estimate the K_e of a perfectly liquid security within well-diversified portfolio of perfectly liquid securities. Accordingly, the CAPM is less applicable for estimating the K_e of a nondiversified portfolio of illiquid investments.

With the development of the MCAPM, a CAPM-based model can be applied to estimate a discount rate or capitalization rate for purposes of a unit principle appraisal. This is because the MCAPM incorporates a component for the increased risk associated with property investment factors—factors that are not mitigated by perfect diversification and perfect liquidity.

For industrial and commercial property that lack the risk-mitigating influences of liquidity, diversification, and/or limited liability, company-specific risk cannot be diversified away. In contrast, the expected K_e of an investment that does possess the

risk and expected return attributes of diversification and liquidity is likely not influenced by a PSRP.

The PSRP is considered directly in the application of the income approach when analysts select a discount rate or capitalization rate for the appraisal of an industrial or commercial property.[9]

Further, the PSRP is considered indirectly in the application of the sales comparison (or market) approach and the cost approach in the appraisal of an industrial or commercial property.

The PSRP is considered directly in the income approach when analysts estimate the K_e for purposes of calculating (1) a cash-flow-based (enterprise) discount rate or capitalization rate or (2) a net-income-based (equity) discount rate or capitalization rate.

The PSRP is considered indirectly in the sales comparison approach when:

- selecting guideline publicly traded companies (i.e., for the stock and debt method) and guideline acquisition transactions (i.e., for the direct sales comparison method) and
- extracting subject-interest-specific pricing multiples from the selected guideline publicly traded companies or the guideline acquisition transactions.

The PSRP is considered indirectly in the cost approach when:

- measuring any intangible value in the nature of goodwill, particularly through the application of the capitalized excess earnings method ("CEEM") of intangible personal property appraisal or
- measuring any economic obsolescence in the cost approach appraisal of the taxpayer unit real estate and personal property, particularly through the application of the capitalization of income loss method ("CILM") of economic obsolescence measurement.

To a certain extent, the magnitude of the selected PSRP may be influenced by the valuation purpose.[10] For example, the selection of the PSRP may be influenced by the following considerations:

1. The statutory, regulatory, judicial, or other standard of value selected—or required—for the valuation assignment (e.g., fair market value, fair value, investment value).
2. The statutory, regulatory, judicial, or other level of value selected—or required for—the valuation assignment (e.g., controlling marketable, noncontrolling marketable, controlling nonmarketable, noncontrolling nonmarketable).
3. The statutory, regulatory, judicial, or other premise of value selected—or required for—the valuation assignment (e.g., value in continued use as a going concern, value in exchange as part of a disposition of assets).

Quantification of a Property-Specific Risk Premium

Analysts may rely on a qualitative analysis to estimate a supportable PSRP. The following discussion summarizes (1) the qualitative factors that analysts may consider and (2) the qualitative procedures that analysts may apply to those factors in order to estimate a PSRP.

Qualitative Factors

Three sets of qualitative factors that analysts may consider are presented below. For purposes of this discussion, these factors are categorized as follows:

1. The National Association of Certified Valuators and Analysts ("NACVA") factors
2. Taxpayer unit competitive analysis factors
3. Taxpayer unit functional analysis factors

A discussion of these three sets of qualitative factors is presented below.

NACVA Factors

In its various publications and educational materials, NACVA has recommended various factors that analysts may consider in the PSRP estimate. The factors may be grouped in the following six categories:

1. Competition
2. Financial strength
3. Management ability and depth
4. Profitability and stability of earnings
5. National economic effects
6. Local economic effects

NACVA indicates that analysts make individual quantitative and qualitative assessments within each of the first four categories of PSRP factors. In order to determine a PSRP, the analyst assigns a specific point value (ranging from 1 point for low risk to 10 points for high risk) to each factor. This point assignment is based on the analyst's

professional judgment with regard to the taxpayer unit operations.

The final two categories are economic factors that analysts assign points of minus one, plus one, or zero—based on a strong economy, weak economy, or neutral economy, respectively. These categories and factors are also scored based on the analyst's professional judgment.

Finally, analysts calculate the sum of (1) all of the point values in the first four categories (weighted by the number of individual factors in each category) and (2) all of the point values in the last two categories. This summation provides an indication for analysts to consider in the judgment-based PSRP estimate.

The NACVA analysis is considered a "numerical procedure." An example of a numerical procedure is presented later in this discussion.

Taxpayer Property Competitive Analysis Factors

The analyst's strategic assessment of the subject property's competitive position provides an analysis structure—based on a competitive advantage and strategy analysis—for estimating the PSRP. This competitive analysis aggregates the PSRP factors into three categories that consider the property's strengths, weaknesses, opportunities, and threats.

These categories of factors are presented as follows:

1. Macroenvironmental factors
2. Taxpayer industry factors
3. Taxpayer/property owner factors

The competitive analysis includes a subgroup of factors for analysts to consider within each of the three categories. This competitive analysis is based on an application of Michael Porter's "Five Forces" strategic planning and analysis model. In this procedure for analyzing the PSRP, a competitive analysis should be part of the analyst's judgment in estimating the PSRP.

The competitive analysis may be applied by considering any of the qualitative factor analysis procedures presented later in this discussion.

Taxpayer Property Functional Analysis Factors

A functional analysis considers the property employed, the functions performed, and the risks assumed with regard to the subject property. Such a functional analysis includes the analyst's consideration of various categories of individual quantitative and qualitative PSRP factors.

One of the functional analysis categories of PSRP considerations relates to the following property-related risk factors:

1. Economy risk
2. Operating risk
3. Asset risk
4. Market risk
5. Regulatory risk
6. Business risk
7. Financial risk
8. Product risk
9. Technological risk
10. Legal risk

Such a functional analysis further presents a category of PSRP considerations relating to the following property-related nonfinancial factors:

1. Economic conditions
2. Location of business
3. Depth of management
4. Barriers to entry into market
5. Industry conditions
6. Competition
7. Quality of management
8. The bottom line

The analyst's property-specific assessment of all these factors is relevant to the PSRP estimate. Moreover, like all of the PSRP factors considered, analysts rely on informed professional judgment when estimating the PSRP.

Documentation Procedures of a Qualitative Factor Analysis

Some analysts apply three procedures for (1) estimating a PSRP based on the qualitative analysis of the property-specific risk factors and (2) documenting the analyst's due diligence and ultimate estimate of the PSRP.

These three documentation procedures are sometimes called:

1. the plus/minus procedure,
2. the numerical procedure, and
3. the listing procedure.

All three of these procedures start with a listing of the relevant PSRP factors selected by the analyst.

These due diligence and analysis documentation procedures are discussed below.

The Plus/Minus Procedure

In the plus/minus (or +/-) documentation procedure, analysts indicate either a "+" notation or a "-" notation next to the test of each factor considered. The plus notation indicates that the factor increases the amount of the PSRP; the minus notation indicates that the factor decreases the amount of the PSRP. A blank notation indicates that the factor has a neutral impact on the amount of the PSRP.

Double or triple notations (e.g., ++ or ---) indicate that the individual factor has a particularly positive or a particularly negative impact on the quantum of the PSRP. Each plus/minus notation, however, does not necessarily represent one percentage point.

Ultimately, the quantum of the PSRP is based on the analyst's professional judgment. The PSRP estimate should not be considered as the mathematical summation of "plus" and "minus" indications.

The Numerical Procedure

Using the numerical documentation procedure, analysts assign a specific percentage number to each PSRP factor considered.

If the analyst assigns "2.0" to a particular factor, that indicates that the analyst adds two percentage points to the quantum of the PSRP factor. If the analyst assigns "(1.0)" to a particular factor, that means that the analyst subtracts one percentage point from the quantum of the PSRP. And, if the analyst assigns "0" to a particular factor, that factor has no impact on the quantum of the PSRP.

In contrast to the previously described "plus/minus" procedure, in the numerical procedure, the analyst's PSRP estimate is informed by the numerical summation of all of the individual values for each PSRP factor.

The Listing Procedure

Applying the listing documentation procedure, analysts list all of the negative—and all of the positive—property-specific risk factors. Analysts do not assign a numerical quantum to either the negative factors or the positive factors. And, analysts do not indicate the relative importance of any individual PSRP factor.

Applying the listing procedure, the analyst estimates the PSRP based on professional judgment.

Example of Qualitative Factor Analysis

Exhibit 1 illustrates the three above-mentioned PSRP documentation procedures as applied to a simplified taxpayer property appraisal. In this simplified example, the analyst identified the strategic, financial, and operational risk factors that most affect the taxpayer's property.

Based on a functional analysis, the analyst assessed each positive and each negative company-specific risk factor affecting the taxpayer property. In Exhibit 1, the analyst prepared three alternative

Exhibit 1
Taxpayer Company
Illustrative Taxpayer Property Appraisal
Documentation of the Analyst's PSRP Assessment
Example of Qualitative Factor Analysis

	Plus/Minus Documentation Procedure	Numerical Documentation Procedure	Listing Documentation Procedure
Analysis of Taxpayer Company Negative Risk Factors			
1. Operating History, Volatility of Revenue and Earnings	+++	3.0	X
2. Lack of Service Line Diversification	++	1.0	X
3. Obsolete Information Technology Systems	+	0.5	X
4. Key Employee Dependence	++	1.0	X
Analysis of Taxpayer Company Positive Risk Factors			
1. Long-Term Contracts with Established Customers	--	-1.0	X
2. Ownership/License of Proprietary Patents, Copyrights, Trademarks, and Trade Secrets	-	-0.5	
Indicated Taxpayer Property PSRP (%)	4.0	4.0	4.0
Analyst's Estimated PSRP (%)			**4.0**

documentation procedures related to the property-specific risk due diligence and analysis.

Exhibit 1 illustrates the three alternative documentation formats or procedures (i.e., plus/minus, numerical, and listing) of the analyst-selected PSRP factors in this taxpayer unit appraisal. In this example, regardless of the due diligence documentation procedure selected, the analyst consistently estimated 4 percent as the PSRP.

In this simplified example, the analyst concludes that 4 percent is the most supportable PSRP estimate.

The next section of this discussion presents various quantitative analyses that analysts may consider as a proxy or benchmark or approximation in the PSRP estimate. These quantitative analyses are intended to be considered by analysts as a proxy or benchmark or approximation to provide general guidance in the PSRP estimate.

Proxies for the Property-Specific Risk Premium

The final PSRP estimate is supported by the analyst's professional judgment. Such professional judgment is based on consideration of:

1. the qualitative factors that may affect the property-specific risk of the taxpayer unit and
2. any market-derived empirical data that may provide a benchmark or approximation of a supportable PSRP.

There are various data sources that analysts may consider to provide guidance as a proxy or benchmark in the PSRP estimate. Unlike the data sources that analysts may consider to measure the S_p component of the K_e, these proxy data sources do not directly measure the PSRP.

Rather, these data sources may be considered by analysts to indirectly measure the PSRP. These data sources represent proxies for—or substitutes for—the PSRP estimate. They are not databases or formulas that provide specific empirical evidence to directly measure the PSRP.

Ultimately, the PSRP estimate is supported by the analyst's professional judgment and functional analysis of the subject property. The data sources described below provide an empirically based, quantitative test of the reasonableness of the analyst's PSRP estimate.

The following discussion summarizes four empirically based, quantitative proxy data sources that analysts may consider to provide guidance in the PSRP estimate. These proxy data source analyses are as follows:

1. Quantum of risk in the MCAPM and the BUM
2. Quartile analysis of Duff & Phelps/Ibbotson 10th size decile
3. Analysis of relative corporate bond ratings and yields
4. Analysis of illiquidity studies (i.e., pre-initial public offering and restricted stock studies)

Quantum of Risk in the MCAPM or BUM

Analysts may consider the different levels (or components) of risk within a K_e measurement model such as the MCAPM or BUM to provide indications of the PSRP estimate. That is, each component of the MCAPM (i.e., R_f, beta-adjusted ERP, and S_p) represent a quantifiable level—or quantum—of risk applicable to the taxpayer property unit.

These quantum of risk levels may be described as follows:

- The R_f is the rate of return that an investor would expect on an investment with no risk. Typically, the R_f sets the minimum rate of return that an investor will expect on any investment. The Rf measures the first quantum of risk in the Ke measurement model.
- The beta-adjusted ERP (in the MCAPM) or the combination of the ERP and the IRP (in the BUM) measure a second quantum of the expected rate of return on an investment in the taxpayer's property. That is, typically this second risk level is the quantum of expected return that motivates investors to forego the riskless investment.
- The S_p is the expected rate of return that an investor expects for investing in small-capitalized companies. For many reasons (in addition to size), small-capitalized companies tend to be riskier investments than large-capitalized companies. The S_p provides the third quantum of the risk levels related to the taxpayer's property.

The analyst now has to estimate the quantum for the fourth level of risk—the PSRP—associated with the taxpayer unit investment. Analysts have empirically based, quantifiable evidence for the first three quanta of risk associated with an investment

in the taxpayer property unit. Analysts can consider that empirically based, quantitative evidence in the PSRP estimate.

Presented in Exhibit 2 is a hypothetical K_e measurement. This K_e measurement considers the first three empirically based measurable quanta of risk levels in the estimation of the fourth judgment-based quantum of risk level (i.e., the PSRP).

The guideline quanta of risk levels presented in Exhibit 2 are based on illustrative data as of December 31, 2018. Specifically, (1) the R_f is based on the 20-year Treasury bond available as of December 31, 2018, (2) the ERP is the "ex post" ERP provided by the Duff & Phelps Cost of Capital Navigator, (3) the industry beta is based on hypothetical guideline publicly traded companies' betas as reported by Bloomberg, (4) the IRP is provided by the Duff & Phelps Cost of Capital Navigator for general contractors – nonresidential buildings (presented solely as an illustrative industry group), and (5) the S_p is provided by the Duff & Phelps Cost of Capital Navigator for size decile 10.

Based on the empirically based quantum of risk data for each of the first three levels of investment risk included in Exhibit 2, an analyst may conclude that 4 percent is a supportable PSRP estimate (i.e., the fourth quantum of risk of the K_e). That analyst conclusion is based on the consideration that the 4 percent PSRP estimate falls within the range of the other empirically based quantum of risk indications.

Exhibit 2
Illustrative PSRP Estimate
Guidance Based on a Proxy Risk Measurement
The Quantum of Risk Measurement Procedure

Application of the Modified Capital Asset Pricing Model (ex post equity risk premium):

Quanta of Risk in the Taxpayer Unit Cost of Equity Capital			Guideline Quantum of the Expected Rate of Return per Risk Level
Risk-Free Rate of Return		2.87%	3%
General Equity Risk Premium	6.91%		
Multiplied by: Industry Beta	0.90		
Industry-Adjusted Risk Premium		6.22%	6%
Size-Related Risk Premium		5.22%	5%
Analyst's Estimated Property-Specific Risk Premium - Based on an Assessment of the Previous Levels of Risk		4.00%	3% to 6%
Indicated Taxpayer Unit Cost of Equity Capital		18.31%	
Selected Cost of Equity Capital (rounded)		**18%**	

Application of the Build-Up Model:

Quanta of Risk in the Taxpayer Unit Cost of Equity Capital		Guideline Quantum of the Expected Rate of Return per Risk Level
Risk-Free Rate of Return	2.87%	3%
General Equity Risk Premium	6.91%	
Industry Equity Risk Premium	0.14%	
Industry-Adjusted Risk Premium	7.05%	7%
Size-Related Risk Premium	5.22%	5%
Analyst's Estimated Property-Specific Risk Premium - Based on an Assessment of the Previous Levels of Risk	4.00%	3% to 7%
Indicated Taxpayer Unit Cost of Equity Capital	19.14%	
Selected Cost of Equity Capital (rounded)	**19%**	

The average quantum of risk in the Exhibit 2 MCAPM K_e analysis (before consideration of the PSRP quantum of risk) is 4.8 percent. And, the average quantum of risk in the Exhibit 2 BUM K_e analysis (before consideration of the PSRP quantum of risk) is 5.0 percent. An analyst may consider the average size of the quantum of risk measured in each of the first three K_e model components in order to indicate a supportable quantum of the PSRP risk level.

The PSRP quantum of risk level estimate may not be constant over time. Like all components of the K_e, the PSRP is influenced by the prevailing economic conditions. Such prevailing economic conditions may upwardly or downwardly affect the various quanta of risk related to the various risk factors.

For example, if the R_f were to decrease from 2.9 percent in December 2018 to 1.9 percent in December 2019, it is likely that corresponding ERPs would decrease (all else being equal). If the expected return on a risk-free investment decreases, then the relative expected return needed to encourage an investor to forego the risk-free investment may also decrease.

The investor would not expect as much of a rate of return premium for investing in generally risky equity investments. This is because the alternative investment (i.e., a risk-free 20-year Treasury bond) now provides a lower rate of return. The quantum of a PSRP risk level indication based (at least in part) on the R_f and the general ERP components of the K_e may correspondingly decrease.

Quartile Analysis of the CRSP Deciles Size Premia Studies 10th Decile

The analyst may consider the University of Chicago Center for Research in Security Prices ("CRSP") Deciles Size Premia Studies 10th decile data (now presented in the Cost of Capital Navigator) to provide some empirical guidance as to a supportable PSRP estimate. While the CRSP Deciles Size Premia Studies data are typically relied on to quantify S_p, these data may also provide guidance with regard to a supportable PSRP range.

Background of the CRSP Deciles Size Premia Studies Data

The first comprehensive study of the size effect (i.e., the relationship of the size of a public company and the rate of return that investors expect on an investment in that company's stock) was performed by Rolf Banz in 1981. Banz examined and compared the returns of small-capitalized NYSE companies to the returns of large-capitalized NYSE companies. The study was performed over the time horizon of 1926 to 1975.

In this study, Banz segmented all NYSE publicly traded companies into 10 deciles—the 1st decile being the largest capitalized public companies and the 10th decile being the smallest capitalized public companies.

Banz concluded that there was an observable negative relationship between (1) the size of a public company and (2) the historical equity investment returns.[11]

That is, the Banz study concluded that as the public company size decreases, historical equity investment returns tend to increase—and vice versa. The so called "size effect," however, was not linear. Rather, the "size effect" was most pronounced in the smallest capitalized public companies.

Furthermore, as the investment holding period increased, the small-capitalized public companies tended to outperform the large-capitalized public companies—in terms of providing a higher rate of return to their investors.

Many of the risk attributes that generally define small-capitalized public companies provide possible explanations for this empirically based relationship between (1) company size and (2) equity return on investment.

In general, small-capitalized public company stocks are less liquid, harder to diversify, and tend to have less available investor information (due to limited security analyst coverage). Small-capitalized companies have fewer financial resources, operational resources, human resources, and strategic resources. These limited resources (compared to larger public companies) limit the smaller public company's ability to prevent larger companies from entering its market and taking its market share.

Due to having better access to capital, large-capitalized public companies tend to have greater ability (1) to hire better quality employees, (2) to spend more on advertising and on research and development, and (3) to endure economic downturns. Additionally, when compared to small public companies, large public companies have a relatively high volume of customers, decreasing their reliance on a few key customers.

The functional and operational differences listed above (this is not a comprehensive list) increase the risk associated with investing in a small public company compared with investing in a large public company. Therefore, investors expect smaller public companies to provide a higher return on equity

investment relative to larger public companies. This conclusion is because investors expect to be compensated for assuming the greater level of investment risk in a smaller public company—compared to the level of investment risk in a larger public company.

The S_p quantifies the increased rate of return that investors expect in order to compensate them for assuming the risk associated with small company investments.

A significant relationship between size of a company and historical equity returns was observed in the Banz study. However, the study concluded that it is not clear whether the relationship is due to company size itself—or to other unknown variables correlated with company size.

That is, small company size may not cause risk—or cause the increased expected investment returns. Rather, the financial and operational disadvantages associated with small company size may be causing the risk—and causing investors to expect higher rates of return on their equity investment.

This Banz study conclusion is summarized in the following statement:

> It is not known whether size [as measured by market capitalization] per se is responsible for the effect or whether size is just a proxy for one or more true unknown factors correlated with size.[12]

As a result of the Banz study, investment professionals began performing their own "size effect" studies. Applying the data reported by the CRSP, Roger Ibbotson and Rex Sinquefield performed a series of "size effect" studies that were published in the Morningstar/Ibbotson annual *Stocks, Bonds, Bills, and Inflation* ("SBBI") *Valuation Yearbook*. Those studies were called the CRSP Deciles Size Premia Studies, and they were summarized annually in the *SBBI Valuation Yearbook* from 1999 to 2016.

In 2016, Morningstar announced it would no longer publish the CRSP Deciles Size Premia Studies in the *SBBI Valuation Yearbook*. Starting with the 2016 edition, the annual study was prepared by Duff & Phelps, and it was published by John Wiley & Sons in the *U.S. Guide to Cost of Capital Valuation Handbook*.

The CRSP Deciles Size Premia Studies continue to segment the NYSE stock returns into deciles by size (as measured by the market capitalization of the publicly traded companies). Based on the NYSE decile breakpoints, the study now includes the entire universe of NYSE/NYSE MKT/Nasdaq-listed securities—rather than just the NYSE-listed securities. The CRSP deciles are now calculated from 1926 to the present year.

The CRSP deciles data include all publicly traded companies. That is, the CRSP Deciles Size Premia Studies data do not exclude financial services companies (companies in finance, insurance, or real estate) or high-financial-risk companies.

Duff & Phelps calculates the CRSP deciles size premiums as follows:

> Size premia represent the difference between historical (observed) excess return and the excess return predicted by the capital asset pricing model (CAPM). . . .
>
> Excess returns are defined here as portfolio returns over and above the risk-free asset's returns.[13]

In this study, the CAPM-predicted return is calculated as the product of (1) the beta ("β") for the subject portfolio (i.e., the subject decile) of public stocks and (2) the expected return on the market portfolio of stocks in excess of the R_f times the ERP. The observed difference after the β adjustment demonstrates that the β of smaller companies does not fully explain the perceived risk associated with smaller companies.

Therefore, the actual rate of equity return offered by smaller companies is not fully explained by the unadjusted CAPM alone. In other words, the β of small companies is underestimated. Accordingly, the unadjusted CAPM underestimates the K_e of smaller companies.

Empirical evidence indicates that the unadjusted CAPM as a measure for the expected returns for smaller companies is imperfect. As a result, it is a generally accepted procedure for analysts to consider a S_p in the K_e calculation.

This S_p consideration is especially relevant for so-called "microcap" companies (i.e., the public companies with equity capitalization in the 9th and 10th deciles), where the S_p is more pronounced. The CRSP deciles size premium data can be used in the application of the MCAPM and of the BUM to estimate a K_e for a smaller size property ownership interest.

The CRSP Deciles Size Premia Studies provides the size premium data and other valuation data previously published in (1) the *SBBI Valuation Yearbook* and (2) the Duff & Phelps *Valuation Handbook – U.S. Guide to Cost of Capital*.

All size premiums provided by Duff & Phelps are "beta-adjusted." This means that the size premiums are adjusted to remove the portion of the excess

return (above the unadjusted CAPM estimate) that is attributable to beta alone. That is, the concluded size premium data by Duff & Phelps measure only the contribution of the size effect to the excess return (above the unadjusted CAPM estimate).

In the application of the MCAPM and the BUM, analysts often apply the CRSP data to estimate the specific S_p for a subject ownership interest. In consideration of a supportable S_p, analysts may (1) first estimate the subject equity value by applying the market approach or the asset-based approach and then (2) second select the applicable Duff & Phelps decile and S_p indication.

When applying the S_p and the IRP provided by Duff & Phelps, adding both an S_p and an IRP to the BUM analysis is not considered to be "double-counting" these risk premiums. This is because (1) the Sp is "beta-adjusted" and (2) the IRP is the measurement of the beta risk. In other words, these two different risk premiums were designed to account for two different types of risk.[14]

Considering the CRSP Deciles Size Premia Studies Data as a Proxy for PSRP

Analysts may consider an analysis of the CRSP Deciles Size Premia Studies 10th decile as an empirically based proxy (or benchmark) in the PSRP estimation. The 10th decile is comprised of the smallest-capitalized public companies included in the CRSP Deciles Size Premia Studies.

The public companies that comprise the 10th decile may be disaggregated into subcategories 10a and 10b, as presented below.

The public companies that comprise the 10a subdecile include companies with market capitalizations between $185.4 million and $321.6 million, and the reported size premium is 3.71 percent (as of December 31, 2018).

The public companies that comprise the 10b subdecile include companies with market capitalizations between $2.5 million and $184.8 million, and the reported size premium is 8.25 percent (as of December 31, 2018).

Within each of the 10a subdecile and 10b subdecile categories of the 10th decile, Duff & Phelps presents two additional subcategories. The 10a subdecile may be disaggregated into 10w and 10x subdeciles, while the subdecile 10b may be disaggregated into 10y and 10z subdeciles.

Companies that are classified in the 10th decile vary considerably in market capitalization and in the applicable S_p. The empirically derived S_p measurements range from 2.89 percent to 11.14 percent, a spread of 8.25 percent, or 825 basis points.

Exhibit 3 presents an analysis of the CRSP Deciles Size Premia Studies data for the 10th decile. The Exhibit 3 empirical data were sourced from the Duff & Phelps Cost of Capital Navigator as of December 31, 2018. These empirical data present the disaggregation of the 10th decile, as of that date.

The 10th decile disaggregation presented in Exhibit 3 provides an indication that investment risk may be related to more than just the S_p examined in the Duff & Phelps and Ibbotson data. For example, subdecile 10y and subdecile 10z are populated by many large (but highly leveraged) public companies with small equity capitalizations. Such large (in terms of revenue and/or assets) public companies with small equity capitalization probably do not match the characteristics of financially healthy but smaller public companies.

As presented in Exhibit 3, as the size of public companies increases, the corresponding S_p decreases. That is why it is important for analysts to correctly interpret and apply the S_p expected return component of the MCAPM (and BUM) measurement of the K_e.

According to Duff & Phelps, "as of December 31, 2018, the reported size premium for the smallest 5 percent of companies by market capitalization as represented by CRSP subdecile 10b is 8.25 percent, and the size premium for the next smallest 5 percent of companies (as represented by CRSP subdecile 10a) is 3.71 percent, a difference of 4.54 percent."[15]

Further, according to Duff & Phelps, "The CRSP Deciles Size Premia include all companies with no

Exhibit 3
CRSP Deciles Size Premia Studies Data
Analysis of the 10th Decile
As of December 31, 2018

Disaggregation of the CRSP 10th Decile	Market Capitalization of the Smallest Public Company ($million)	Market Capitalization of the Largest Public Company ($million)	S_p – Size Premium (Actual Return in Excess of the Return Predicted by CAPM)
10a	185.418	321.578	3.71%
10w	250.270	321.578	2.89%
10x	185.418	250.248	4.68%
10b	2.455	184.785	8.25%
10y	109.462	184.785	6.85%
10z	2.455	109.406	11.14%

exclusion of speculative (e.g., start-up) or distressed companies whose market capitalization may be small because they are speculative or distressed."[16]

The distressed company issue may be considered through an analysis of the 10th decile subcategories of 10y and 10z, as presented in Exhibit 4 and Exhibit 5.

As presented in Exhibit 4, the subdecile 10y public companies report five-year net income ranging from negative $44.5 million to a positive $14.7 million. The subdecile 10y public companies are significantly smaller than other public companies in the CRSP Deciles Size Premia Studies. In addition, more than half of these subdecile 10y companies are unprofitable.

As presented in Exhibit 5, subdecile 10z includes public companies in the 5th percentile that report five-year average earnings before interest, taxes, depreciation, and amortization ("EBITDA") of negative $19.3 million. The public companies classified in subdecile 10z at or below the 50th percentile (i.e., the lower quartile) reported negative EBITDA.

Collectively, the data in Exhibit 4 and Exhibit 5 support the conclusion that the CRSP Deciles Size Premia Studies 10th decile is comprised of financially troubled and financially distressed companies.

Moreover, Duff & Phelps presents the following conclusion with regard to subdecile 10y and subdecile 10z:[17]

> Subdecile 10y and subdecile 10z are populated by many large (but highly leveraged) companies with small market capitalizations that probably do not match the characteristics of financially healthy but small companies (see "Total Assets," 95th percentile measures).

According to James Hitchner, writing in *Financial Valuation and Litigation Expert*, "It's important to note that 80 percent of the companies in decile category 10b are from 10z. As such, let's focus on 10z. At the 50th percentile of 10z the operating margin is -1.11 percent. Yes, on average, these companies are losing money. At the 25th percentile the operating margin is -21.27 percent. Furthermore, 62 percent of the companies in 10z are from only three industry sectors: financial services, technology, and healthcare."[18]

That is, analysts may consider the S_p data associated with CRSP size categories 10w, 10x, 10y, and 10z to provide guidance for the PSRP estimate for the taxpayer unit. These data are presented in the far right column of Exhibit 3 (as of December 31, 2018).

In particular, analysts may consider (1) the difference between the 10x and the 10w size premiums (e.g., 4.68 percent and 2.89 percent, respectively) and (2) the difference between the 10z and the 10y size premiums (e.g., 11.14 percent and 6.85 percent, respectively).

These differences in the size premiums (of approximately 2 percent to 4 percent) may provide an empirically based proxy or benchmark for the PSRP estimate.

Such consideration of the CRSP Deciles Size Premia Studies 10th decile may provide a reasonableness test for the analyst's judgment-based PSRP estimate with regard to the particular unsystematic risk profile of the taxpayer unit.

As indicated by Hitchner, based on dated information that is still relevant, not only does the CRSP Deciles Size Premia Studies 10th decile include financially troubled companies, it is also skewed by its industry concentration.

As presented above, the actual returns earned in excess of the returns predicted by the CAPM were 6.85 percent for subdecile 10y and 11.14 percent for subdecile 10z (or a difference of 429 basis points) as of December 31, 2018. This 4.29 percent return premium difference may (in part or in whole) be an indication of the quantum of return that is correlated with various types of financial and operational risk—and not just with the size of the taxpayer unit.

The delta between (1) subdecile 10y and subdecile 10z or (2) subdecile 10a and subdecile 10b may provide an indication for the investment return premiums related to the types of risks that are more often associated with the PSRP than with the S_p.

Analysis of Relative Bond Ratings and Bond Yields

The lack of diversification of the business operations of many taxpayer property units suggests that the relevant risk measure for investors may be "total risk." Total risk includes unsystematic risk (i.e., the total risk associated with an investment in any ownership interest includes property-specific risk).

For an undiversified equity investment in a taxpayer unit, some form of unsystematic risk likely exists—and should be considered when measuring the K_e.

However, quantifying the property-specific risk is a challenging process. In part, this is because most of the data typically considered to measure the

Exhibit 4
CRSP Deciles Size Premia Studies Data
Analysis of the 10y Subdecile
As of September 30, 2018

CRSP Decile 10y Percentiles	Market Value of Equity ($MM)	Book Value of Equity ($MM)	5-Year Average Net Income ($MM)	Market Value of Invested Capital ($MM)	Total Assets ($MM)	5-Year Average EBITDA ($MM)	Revenue ($MM)	Return on Book Value of Equity (%)
95th Percentile	180.567	206.050	14.660	596.811	1,480.151	90.734	936.174	34.2
75th Percentile	164.136	120.009	6.538	222.403	794.153	18.455	159.984	8.0
50th Percentile	145.135	73.664	(2.419)	177.823	163.197	-	49.969	(0.4)
25th Percentile	124.566	32.859	(19.152)	142.236	65.786	(12.043)	21.920	(54.7)
5th Percentile	109.977	0.014	(44.510)	115.058	23.418	(27.018)	0.480	(144.8)

EBITDA = Earnings before interest, taxes, depreciation, and amortization
Note: The data presented above are sourced as of September, but Duff & Phelps relies on these data for its size decile data as of December.
Source: Duff & Phelps 2019 Cost of Capital: Annual U.S. Guidance and Examples, Cost of Capital Navigator.

Exhibit 5
CRSP Deciles Size Premia Studies Data
Analysis of the 10z Subdecile
As of September 30, 2018

CRSP Decile 10z Percentiles	Market Value of Equity ($MM)	Book Value of Equity ($MM)	5-Year Average Net Income ($MM)	Market Value of Invested Capital ($MM)	Total Assets ($MM)	5-Year Average EBITDA ($MM)	Revenue ($MM)	Return on Book Value of Equity (%)
95th Percentile	94.613	115.874	5.684	225.088	668.823	23.478	336.341	22.6
75th Percentile	68.696	48.302	0.515	92.630	114.147	3.654	67.537	3.3
50th Percentile	41.957	21.530	(4.484)	56.026	42.808	(1.188)	20.507	(14.1)
25th Percentile	19.913	8.221	(13.786)	25.737	17.667	(8.672)	2.466	(89.7)
5th Percentile	8.086	(0.573)	(25.807)	9.623	5.589	(19.331)	-	(181.1)

EBITDA = Earnings before interest, taxes, depreciation, and amortization
Note: The data presented above are sourced as of September, but Duff & Phelps relies on these data for its size decile data as of December.
Source: Duff & Phelps 2019 Cost of Capital: Annual U.S. Guidance and Examples, Cost of Capital Navigator.

K_e are based on public company information—and public companies tend to be well diversified. Such diversification tends to reduce or eliminate the property-specific risk component of the K_e.

Another procedure that analysts may consider as an empirically based proxy (or benchmark) to provide guidance in the PSRP estimate is an analysis of the high-yield bond spread. A high-yield bond is a bond with a credit rating below investment-grade corporate bonds.

High-yield bonds pay a higher yield than investment-grade bonds. This high yield is typically (1) because of some high-risk factors or (2) because the issuing debtor company is financially distressed.

The yield on a typical corporate bond is comprised of the following components:

1. Real rate of return and a return premium for expected inflation. These two rate of return components are included in a government bond yield, also known as the risk-free rate—or the R_f.
2. Default risk premium. The default risk premium is measured as the required rate of return in the market in order to compensate investors for the risk of default on a corporate bond. Typically, the default risk premium is measured as the spread between (a) the yields on risky corporate bonds and (b) the yield on a U.S. Treasury bond (the yield that is also known as the R_f).

The risk of default is one component of investment risk that is likely to be minimized (or diversified away) in a diversified portfolio of debt investments. For example, let's assume an investor's portfolio is made up of a well-diversified portfolio of, say, 100 different corporate bond holdings. The risk that a default of one—or a few—of those debt instrument investments having a significant negative impact on the investor's portfolio return will be low.

The default risk premium in a high-yield bond is significantly higher than the default risk premium for an investment-grade bond. Such a default risk premium reflects the additional risk of a high-yield bond holder being unable to realize the expected cash flow from the issuing debtor company. In this way, the risk profile of the high-yield debt investor in a distressed debtor company is similar to the risk profile of an equity investor in a nondistressed company.

Because a high-yield bond is a bond with a credit rating below an investment-grade corporate bond, a high-yield bond typically pays a higher yield than an investment-grade bond. Of course, investors expect this higher yield because of the high-risk factors associated with the debtor company. The level of risk between the observed investment-grade corporate bonds and the high-yield "junk bonds" may provide a proxy to assist the analyst in the PSRP estimate.

As presented in Exhibit 6, the yields on various forms of bonds (and bond indices) vary based on the subject bond—or the subject bond index—risk profile.

The first debt security presented in Exhibit 6 is a six-month Treasury bill. Treasury bills (or T-bills) are sold with maturities ranging from a few days to 52 weeks. T-bills are typically sold at a price discount from the stated par amount (the par amount of a T-bill is also called the face value).

Rarely, T-bills have sold at a price equal to the par amount. Such a sale effectively results in a 0 percent yield to the investor. When a T-bill matures, the security holder is paid the par amount. If the T-bill's par amount is greater than the T-bill's purchase price, then the difference is the interest (or the yield) earned by the investor.

The next debt security presented in Exhibit 6 is a 10-year Treasury note. Treasury notes (or T-notes) earn a fixed rate of interest every six months until maturity. T-notes are issued with typical maturities of 2 years to 10 years.

In addition, the U.S. Treasury also issues Treasury bonds. Treasury bonds (or T-bonds) pay a fixed rate of interest every six months until they mature. Treasury bonds are issued with typical maturities of 20 years or 30 years.

All T-bills, T-notes, and T-bonds are issued by the U.S. Department of Treasury and are typically considered to be risk-free securities. As mentioned earlier, for technical data consistency purposes, the 20-year T-bond is typically used as the R_f when the analyst measures the K_e.

Exhibit 6
Bonds and Bond Index Yields
As of December 31, 2018

6-Month U.S. Treasury Bill	2.5%
10-Year U.S. Treasury Note	2.7%
Moody's Aaa Corporate Bond Index	4.0%
Moody's Aa Corporate Bond Index	4.2%
Moody's A Corporate Bond Index	4.3%
Moody's Baa Corporate Bond Index	5.1%
ICE BofAML BB U.S. High Yield Index	6.3%
ICE BofAML B U.S. High Yield Index	8.4%
ICE BofAML CCC & Below U.S. High Yield Index	13.7%

Source: Bloomberg and ICE BofAML.

The next tranche of debt securities presented in Exhibit 6 is the long-term corporate bond indexes for Aaa-, Aa-, A-, and Baa-rated corporate bonds, as rated by Moody's. Moody's is an internationally recognized credit rating agency. These rating categories for corporate and institutional bonds (i.e., Aaa through Baa) are typically referred to as "investment grade."

According to Moody's, "long-term obligation ratings are opinions of the relative credit risk of fixed-income obligations with an original maturity of one year or more. They address the possibility that a financial obligation will not be honored as promised. Such ratings reflect both the likelihood of default and any financial loss suffered in the event of default."[19]

Aaa-rated corporate debt obligations are considered to be of the highest quality with minimal risk. Aa-rated corporate debt obligations are considered to be of high quality and are subject to very low credit risk. A-rated corporate debt obligations are considered to be upper-medium-grade and are subject to low credit risk. Baa-rated corporate debt obligations are subject to moderate credit risk. Baa-rated corporate bonds are considered medium-grade and, as such, these bonds may possess speculative characteristics.

As presented in Exhibit 6, the highest-rated corporate bond index yield equals 4.0 percent, or 130 basis points above the 10-year T-note yield of 2.7 percent. That is, the incremental level of return required to attract a debt investor away from a risk-free investment to a risky (albeit low risk) investment is about 1.3 percent.

The third tranche of the debt securities presented in Exhibit 6 is considered to be high-yield or "below investment grade." Such debt instruments are market-capitalization-weighted indices of domestic corporate high-yield bonds. The indices track the performance of high-yield debt securities traded in the U.S. bond market.

The high-yield debt securities are considered to be below investment-grade rating (based on an average rating of the Moody's, S&P, and Fitch credit rating agencies). The debt securities included in these indices have at least 18 months to final maturity at the time of issuance, have at least a one year remaining term to final maturity as of the rebalancing date, have a fixed coupon schedule, and have a minimum amount outstanding of $250 million.

As presented in Exhibit 6, the lowest rated high-yield bond index yield as of the observation date equals 13.7 percent, which is (1) 530 basis points above the B-rated index yield of 8.4 percent and (2) 860 basis points above the lowest investment-grade index yield of 5.1 percent.

The lowest rated bonds (i.e., CCC and below) are typically referred to as "junk" bonds. Junk bonds have a high risk of default. And, like the companies that comprise the Duff & Phelps subdecile 10y and subdecile 10z (discussed above), the debtor companies that issue such junk bonds are often financially distressed.

The difference in the level of return on junk bonds and on other "below-investment-grade" bonds may provide guidance to the analyst as a proxy or benchmark for the PSRP estimate.

That is, the incremental return between a junk bond index (13.7 percent from Exhibit 6) and the B-rated bond index (8.4 percent from Exhibit 6) may provide an indication of the incremental return that debt investors expect as compensation for the factors that pertain to property-specific risk—such as financial distress, liquidity risk, and so forth.

The analyst may consider the yield differentials presented in Exhibit 6 as one source of empirically based evidence to indicate a supportable PSRP estimate. In particular, the analyst may consider the difference between:

1. the B-rated high yield investments (i.e., 8.4 percent on the observation date) and
2. the CCC and below-rated high-yield investments (i.e., 13.7 percent on the observation date).

This differential in high-yield bond returns—of approximately 5 percent—may provide analysts with an empirically based reasonableness test for a judgment-based PSRP estimate.

While this analysis of high-yield debt instruments does not directly measure the PSRP, it may provide analysts with a proxy of empirically based data that provide guidance for the PSRP estimate.

Analysis of Illiquidity Studies (Pre-IPO and Restricted Stock Studies)

While typically used to estimate a valuation discount for lack of marketability ("DLOM"), these studies may also provide a proxy—or benchmark—for a reasonableness test of the analyst's judgment-based PSRP estimate.

Relevant illiquidity studies that may provide an empirically based proxy for the analyst's PSRP estimate include the following: (1) pre-initial public offering ("IPO") studies such as the Emory Studies and the Valuation Advisor Studies and (2) a variety of restricted stock studies.

The variety of so-called restricted stock studies all observe the market prices of public company restricted stock sales and include such actual transactional data dating back to the late 1960s. These restricted stock studies indicate an average price discount (compared to the trading price of the same public company stock without the trading restriction) for public company restricted stock of:

1. approximately 35 percent for transactions occurring in the 1968 to 1988 period and
2. approximately 20 percent to 25 percent for transactions occurring after 1990.

The decrease in the observed price discounts is typically explained by the more recent shortened investment holding period for restricted stocks under Securities and Exchange Commission Rule 144.

The analyst may consider the DLOM measurements indicated by the restricted stock studies as a proxy to assess the reasonableness of a judgment-based PSRP estimate. As a simplified illustrative example, let's assume that the analyst selects a 20 percent DLOM with regard to the valuation of the taxpayer unit. This DLOM recognizes that the taxpayer's operating property is not as liquid as the stock of publicly traded companies.

Exhibit 7
Discount for Lack of Marketability Empirical Data As a Proxy Data Source to Assess the Reasonableness of the PSRP Estimate Based on a Restricted Stock Studies Analysis

MCAPM or BUM K_e Measurement:	
Risk-Free Rate of Return	2.9%
Industry-Adjusted General Risk Premium	6.9%
Size-Related Risk Premium	3.4%
Pre-PSRP Indicated Taxpayer Unit Cost of Equity Capital	13.2%
Analyst-Estimated PSRP	3.0%
Selected Risk-Adjusted Taxpayer Unit Cost of Equity Capital	16.2%
Reasonableness Test of the Analyst's PSRP Estimate:	
Pre-PSRP Indicated Taxpayer Unit Cost of Equity Capital	13.2%
Divided by: (One minus the 20% DLOM Percentage)	80.0%
Equals: Indicated Taxpayer Unit Risk-Adjusted Cost of Equity Capital	16.5%

The analyst may test the reasonableness of the judgment-based PSRP estimate by reference to this DLOM proxy. Exhibit 7 presents an illustrative example of such a PSRP estimate reasonableness test.

The pre-PSRP indicated K_e presented in Exhibit 7 illustrates a hypothetical MCAPM or BUM measurement of the subject taxpayer K_e—before consideration of the PSRP. The analyst considers the DLOM valuation adjustment to the pre-PSRP indicated K_e that may be supportable for a public company. Adjusting the pre-PSRP indicated K_e by the selected DLOM results in a risk-adjusted K_e after consideration of the PSRP that may be more supportable for a taxpayer's property unit.

The 3.3 percent delta between the pre-PSRP indicated K_e (of 13.2 percent) and the risk-adjusted K_e (of 16.5 percent) provides an indication of the illiquidity component of the property-specific risk (expressed as a DLOM) in the K_e.

That is, all else being equal, the difference between the K_e of a public company and the K_e of a subject property (in this illustration, the 3.3 percent delta) may be explained as consideration of illiquidity issues that operating properties experience (and that public company securities do not experience).

This consideration of these illiquidity issues may not capture the total quantum of the PSRP for a property unit. However, this consideration of the DLOM may provide the analyst with an empirically based proxy for the reasonableness test of a judgment-based PSRP estimate.

The Property-Specific Risk Premium and a Functional Analysis

Typically, in the process of identifying and estimating any PSRP component of a K_e, analysts perform a functional analysis of the subject property unit. This functional analysis is discussed next.

Description of a Functional Analysis

A functional analysis is one component of the PSRP identification and estimation process.

A functional analysis is often applied for purposes of assessing the comparability of the taxpayer's property unit to selected guideline or benchmark entities. These selected guideline or benchmark entities are typically considered to be comparable (or guideline) companies.

The development of a functional analysis is relevant in that context.

As will be described, the regulations related to Internal Revenue Code Section 482 explain the application of a functional analysis for purposes of determining reliability. And, the Organisation for Economic Cooperation and Development ("OECD") regulations describe the application of a functional analysis within the context of an intercompany transfer of tangible property, intangible property, or services between two OECD countries.

A functional analysis is certainly relevant to such an intercompany transfer price determination made for purposes of Section 482 compliance (or of OECD regulations compliance). In addition to applicability to a transfer price analysis, a functional analysis is also relevant within the context of a discount rate or capitalization rate development as part of unit principle valuation.

Many observers initially think of a functional analysis within the context of an intercompany transfer price determination between the controlled entities of a taxpayer (often a multinational taxpayer) for Section 482 (or for OECD) compliance purposes. While there are broader applications of a functional analysis, the Section 482 (and the corresponding OECD) regulations do provide a definition of a functional analysis that is generally applicable for this discount rate and capitalization rate development discussion.

Regulation 1.482-1(d)(3)(i) relates to comparability issues with regard to the allocation of income and deductions among taxpayers. Specifically, this regulation section deals with the factors for determining comparability of transactions and companies. This regulation section describes a functional analysis as follows:

> (i) Functional analysis. Determining the degree of comparability between controlled and uncontrolled transactions requires a comparison of the functions performed, and associated resources employed, by the taxpayers in each transaction. This comparison is based on a functional analysis that identifies and compares the economically significant activities undertaken, or to be undertaken, by the taxpayers in both controlled and uncontrolled transactions. A functional analysis should also include consideration of the resources that are employed, or to be employed, in conjunction with the activities undertaken, including consideration of the type of assets used, such as plant and equipment, or the use of valuable intangibles. A functional analysis is not a pricing method and does not itself determine the arm's length result for the controlled transaction under review. Functions that may need to be accounted for in determining the comparability of two transactions include –
>
> (A) Research and development;
>
> (B) Product design and engineering;
>
> (C) Manufacturing, production, and process engineering;
>
> (D) Product fabrication, extraction, and assembly;
>
> (E) Purchasing and materials management;
>
> (F) Marketing and distribution functions, including inventory management, warranty administration, and advertising activities;
>
> (G) Transportation and warehousing; and
>
> (H) Managerial, legal, accounting and finance, credit and collection, training and personal management services.

While this regulation section lists eight functions, it does not imply that the eight-item list is exhaustive. Rather, the regulation section indicates that the factors to consider "include" the eight listed functions. In addition, the regulation does not imply that the eight listed factors cannot be disaggregated or rearranged.

Within the context of estimating the PSRP cost of capital component for a property unit, a functional analysis may consider the following risk and expected return topics:

- What products and services are offered to customers or clients (and how are those products and services designed or developed)
- What is the source of supply of the materials, labor, and overhead that is needed to produce those products and services (including sourcing dependence and sourcing logistics issues)
- How the products and services are manufactured or otherwise produced
- How the products and services are differentiated, promoted, priced, and sold (including advertising and branding issues)
- How the inventory of products and services (including raw materials, work in process, and finished goods/services) are created, packaged, and stored
- How the products and services are delivered (including shipping, transportation, and other delivery logistics issues)

- What assets are utilized to perform the functions within the taxpayer's property unit (including working capital assets, tangible property, and intangible property)
- How profits are earned in the property (including the cost/volume/profit relationships with regard to both (1) production/service creation cost of sales and (2) production/service delivery revenue recognition)
- How the accounting, finance, human resources, management information, marketing, sales, and other administrative activities operate within the property unit
- How the taxpayer's property unit is organized, managed, and capitalized (legally and administratively), including both (1) the relationship between the taxpayer owners and the taxpayer operators/managers and (2) the relationship between the taxpayer and its sources of capital

There are various financial, competitive, and operational analyses that are components of the functional analysis.

Components of the Functional Analysis

Exhibit 8 present a listing of the typical considerations in the analyst's development of a functional analysis. Exhibit 8 serves as a checklist of considerations for any analyst who is considering the PSRP component of a discount rate or direct capitalization rate for a unit principle appraisal.

The functional analysis considerations listed in Exhibit 8 may be used to develop an understanding of the property unit. Analysts may apply this understanding in the estimation of—and the documentation of—the PSRP component of the discount rate or direct capitalization rate.

Risk Considerations in a Functional Analysis

One reason to conduct a functional analysis is to allow the analyst to identify the risks that are being assumed by the subject property unit. A significant portion of the return earned by the taxpayer's operations is due to the risks assumed by the taxpayer's property unit.

The functional analysis allows analysts to compare these risks (1) within the property unit; (2) between the property unit and the selected comparable (guideline) companies, transactions, and licenses; and (3) between related party (or associated) entities in a controlled transaction.

The analyst applies these risk considerations in the estimation of—and the documentation of—the PSRP component of the discount rate and the direct capitalization rate.

The 12 Steps of the Functional Analysis

In the PSRP estimate, analysts typically group all of the above-listed functional analysis considerations into 12 steps—or categories of analyst procedures and investigations. Analysts perform these 12 steps in the estimate of—and the documentation of—the PSRP component of the discount rate or the direct capitalization rate.

These 12 steps—or categories or groupings of analyst procedures—are listed in Exhibit 9.

The first 10 steps in Exhibit 9 primarily relate to the functions performed at the private company. Step 11 in Exhibit 9 primarily relates to the assets employed at the taxpayer's property unit. And, step 12 in Exhibit 9 primarily relates to the risks assumed by the taxpayer's property unit.

Application of the Functional Analysis to Measure the Property-Specific Risk Premium

Based on the discussion above, analysts consider the functional analysis procedures presented in Exhibit 9. Considering these functional analysis procedures, the analyst considers this functional analysis when estimating the PSRP component of the discount rate and the direct capitalization rate.

Summary and Conclusion

Analysts are often asked to appraise the taxpayer's industrial or commercial property for property tax compliance, appeal, or litigation purposes. Depending on the attributes of the taxpayer's industrial or commercial property, the analyst may apply summation principle property appraisal approaches or unit principle property appraisal approaches.

If the unit valuation principle is applicable to the property, the analyst will apply generally accepted property appraisal approaches and methods to value the taxpayer's total unit (or assemblage) of real and personal property. Often, particularly within the context of a unit principle appraisal of an industrial or commercial property, these analysts apply income approach property appraisal methods.

Exhibit 8
Taxpayer Property Unit
Functional Analysis Considerations
Application to the PSRP Estimate in the
Discount Rate or Capitalization Rate Development

1. Taxpayer property owner/operator organization considerations

A. Type of taxpayer owner/operator entity

1. Description of whether the taxpayer's property unit is a business entity or other type of business ownership interest
2. Description and documentation of ownership of the subject entity
3. Description of legal structure of the subject entity
4. Description of tax structure of the subject entity
5. Description of any ownership relationships with related parties, applicable parties, or other common ownership
6. Description of corporate governance (e.g., board of directors)
7. Description of operational executive or management structure (e.g., management organization chart)
8. Description of operational functions structure (e.g., departmental organization chart)
9. Description and locations of owned tangible property
10. Description and locations of leased tangible property
11. Description of owned or licensed patents
12. Description of owned or licensed trademarks
13. Description of owned or licensed copyrights
14. Description of owned or licensed trade secrets
15. Description of owned or licensed other types of intangible property
16. Description of owned or licensed intangible value in the nature of goodwill

B. Taxpayer property owner/operator entity documents

1. Organization documents (e.g., articles of the corporation)
2. Operational documents (e.g., shareholders agreements)
3. Entity ownership documents (e.g., shareholder agreements, buy/sell agreements)
4. Asset ownership documents (e.g., deeds, legal descriptions, licenses, leases)
5. Entity transferability documents (e.g., franchise agreement restrictions, regulated industry considerations)
6. Ownership interest transferability considerations (e.g., security puts and calls)
7. Recent board of directors or executive/management committee minutes
8. Copies of any business or operating permits or certificates
9. Copies of any inbound or outbound intellectual property licenses
10. Copies of any joint venture, joint development, joint commercialization, etc., agreements
11. List of registrations of all intellectual property, including domestic and international patents, copyrights, and trademarks
12. Copies of documents that illustrate the taxpayer property unit's use of domestic and international patents, copyrights, trademarks, and trade names
13. Copies of documents that illustrate the taxpayer property unit's use of other types of intangible property
14. Copies of documents that illustrate the taxpayer property unit's use of intangible value in the nature of goodwill

Exhibit 8 (cont.)
Taxpayer Property Unit
Functional Analysis Considerations
Application to the PSRP Estimate in the
Discount Rate or Capitalization Rate Development

2. Taxpayer property unit operational considerations

A. Taxpayer property unit operational functions

1. Description of products produced and services provided
2. Description of how products and services are designed, developed, or engineered
3. Description of raw materials inputs (sources, costs, and logistics of supply and supply chain risks)
4. Description of labor inputs (sources, costs, and logistics of supply and supply chain risks)
5. Description of overhead (operating expense inputs) (sources, costs, and logistics of supply and supply chain risks)
6. Description of product manufacturing or services production process
7. Description of production scheduling and quality control procedures
8. Description of product warehousing and in-process services storage
9. Description of product warranty and product return risk elements
10. Description of products and services shipping and delivery logistics
11. Description of how intellectual property (patents, copyrights, trademarks, and trade secrets) are developed, documented, and registered
12. Description of how intellectual property (patents, copyrights, trademarks, and trade secrets) are commercialized and protected
13. Description of how other types of intangible property are commercialized and protected
14. Description of how intangible value in the nature of goodwill is commercialized and protected

B. Taxpayer property unit administrative functions

1. Description of accounting functions
2. Description of receivables/cash collection function and payables/cash disbursement function
3. Description of treasury (cash management and banking relationship) function
4. Description of capitalization, capital structure, and financing functions
5. Description of products/services design and engineering function
6. Description of production engineering/services delivery efficiency function
7. Description of advertising and market research function
8. Description of packaging and branding function
9. Description of human resources, recruiting, training, and benefits function
10. Description of general counsel function
11. Description of information technology, management information, and data processing function
12. Description of regulatory compliance and other compliance functions

C. Taxpayer property unit competition and competitive position functions

1. Listing and description of principal competitors
2. Approximate size of principal competitors
3. Ranking of principal competitors by market share and by relative market share
4. Products/services features differentiation with competitors
5. Products/services pricing differentiation with competitors
6. Products/services distribution differentiation with competitors
7. Products/services intellectual property differentiation with competitors
8. Description of total market size

Exhibit 8 (cont.)
Taxpayer Property Unit
Functional Analysis Considerations
Application to the PSRP Estimate in the
Discount Rate or Capitalization Rate Development

9. Description of total market growth rate
10. Description of how customers use the taxpayer units products/services

D. Taxpayer property unit risk/expected return considerations

1. Description of materials source of supply risk
2. Description of labor source and supply risk
3. Description of operating leverage (fixed costs coverage) risk
4. Description of financing leverage (debt service coverage) risk
5. Description of tangible property risk
6. Description of environmental risk
7. Description of litigation risk
8. Description of intellectual property risk
9. Description of customer concentration risk
10. Description of executive concentration risk
11. Description of regulatory change risk
12. Description of products/services liability risk

3. Taxpayer property unit financial considerations

A. Taxpayer property unit accounting principles and financial statements

1. Descriptions of current accounting principles applied
2. Comparison of property owner/operator entity accounting principles to competitor accounting principles
3. Description of recent changes in accounting principles applied
4. Discussion of revenue recognition principles
5. Discussion of expense recognition principles
6. Discussion of taxation accrual and deferred tax principles
7. Discussion of tangible asset capitalization and depreciation principles
8. Discussion of intangible asset recognition principles
9. Discussion of liability recognition principles
10. Discussion of any adjustments to capital accounts
11. Discussion of cash flow statement working capital adjustments
12. Discussion of cash flow statement noncash revenue and expense account
13. Discussion of cash flow statement investment adjustments
14. Discussion of cash flow statement financing adjustments

B. Taxpayer property unit financial statement projection considerations

1. Description of the term (time period) of any financial projections
2. Description of the level of detail included in any financial projections
3. Description of financial projections internal development procedures
4. Description of financial projections internal review procedures
5. Comparison of financial projections to historical financial statements
6. Comparison of financial projections to guideline company financial projections
7. Comparison of financial projections to industry financial projections

Exhibit 8 (cont.)
Taxpayer Property Unit
Functional Analysis Considerations
Application to the PSRP Estimate in the
Discount Rate or Capitalization Rate Development

8. Comparison of historical financial projections to historical financial statements for prior projection periods
9. Copies of any strategic plans or competitive analyses
10. Copies of any debt service payment projections (including any considerations of liquidity or solvency)

C. Taxpayer property unit appraisal considerations

1. Description of the process for selecting guideline public companies
2. Procedures for assessing the taxpayer unit's comparability to selected guideline public companies
3. Procedures for adjusting the financial data of guideline public companies
4. Description of the process for selecting guideline M&A transactions
5. Procedures for assessing the taxpayer unit's comparability to selected guideline M&A transactions
6. Procedures for adjusting the financial data of selected guideline M&A transactions
7. Description of any recent offers to buy the taxpayer unit or the taxpayer unit's securities
8. Description of any recent sales (or other exchanges) of the taxpayer unit or the taxpayer unit's securities
9. Descriptions of any value indications (including historical development costs) of tangible real property and tangible personal property
10. Descriptions of any value indications (including historical development costs) of intellectual property or associated intangible property

4. Taxpayer property unit assets employed and SWOT/risks assumed considerations

A. Taxpayer property unit assets employed

1. Description of—and use of—cash and marketable securities
2. Description of—and use of—accounts receivable
3. Description of—and use of—prepaid expenses
4. Description of—and use of—inventory accounts
5. Description of—and use of—other current asset accounts
6. Description of—and use of—land and buildings
7. Description of—and use of—tangible personal property
8. Description of—and use of—other tangible assets
9. Description of—and use of—intellectual property assets
10. Description of—and use of—other identifiable intangible assets
11. Description of—and use of—intangible value in the nature of goodwill
12. Description of—and use of—nonoperating or investment assets
13. Description of—and use of—current liabilities
14. Description of—and use of—long-term interest-bearing debt
15. Description of—and use of—other long-term liabilities
16. Description of—and use of—contingent liabilities

Exhibit 8 (cont.)
Taxpayer Property Unit
Functional Analysis Considerations
Application to the PSRP Estimate in the
Discount Rate or Capitalization Rate Development

B. Taxpayer property unit SWOT and risks assumed considerations

1. List of the principal competitive strengths
2. Description of how competitive strengths affect the taxpayer property unit's operating results
3. Description of how competitive strengths affect the taxpayer property unit's risks
4. List of the principal competitive weaknesses
5. Description of how competitive weaknesses affect the taxpayer property unit's operating results
6. Description of how competitive weaknesses affect the taxpayer property unit's risks
7. List of the principal competitive opportunities
8. Description of how competitive opportunities affect the taxpayer property unit's operating results
9. Description of how competitive opportunities affect the taxpayer property unit's risks
10. List of the principal competitive threats
11. Description of how the principal competitive threats affect the taxpayer property unit's operating results
12. Description of how the principal competitive threats affect the taxpayer property unit's risks

Most of these property appraisal analyses involve the analyst's measurement of the property's cost of capital. This cost of capital becomes the basis for the analyst's development of the applicable yield capitalization rate or direct capitalization rate.

For many unit principle property appraisals, the discount rate and direct capitalization rate include the analyst's estimate of a property-specific risk premium. This discussion describes various procedures that analysts may apply to estimate the PSRP.

This discussion explained the reasons why the PSRP should be included in the various Ke measurement models. This discussion also described the qualitative factors that the analyst considers in the judgment-based PSRP estimate. This PSRP estimate is one component of what is often called "alpha" in the measurement of a property-specific cost of capital.

This discussion summarized the market-derived, empirical data sources that the analyst may consider as a proxy—or benchmark—in the quantitative estimate of the PSRP. These empirical data sources do not directly measure the PSRP. That is because the PSRP is unique to each individual property unit. However, these empirical data sources provide general guidance to support the PSRP estimate.

Finally, this discussion summarized one procedure that impacts both the qualitative and quantitative assessment of the PSRP: the functional analysis of the taxpayer's property as a component of the unit principle property appraisal.

Notes:

1. 2018 Cost of Capital: Annual U.S. Guidance and Examples, Duff & Phelps Cost of Capital Navigator.
2. Gary R. Trugman, *Understanding Business Valuation: A Practical Guide to Valuing Small to Medium Sized Businesses*, 5th ed. (Hoboken, NJ: John Wiley & Sons, 2017), 545.
3. Ibid., 546.
4. Ibid.
5. Ibid.
6. Ibid., 552.
7. Duff & Phelps *2017 Valuation Handbook – U.S. Guide to Cost of Capital* (Hoboken, NJ: John Wiley & Sons, 2017), Exhibit A-3.
8. Shannon P. Pratt and Alina V. Niculita, *Valuing a Business: The Analysis and Valuation of Closely Held Companies*, 5th ed. (NY: McGraw Hill Companies, 2008), 185.
9. PSRP may also be relevant when valuing real property, personal property, and other types of illiquid investments. When applying an *investment*-specific risk premium in analyses where the valuation subject is not a business interest,

Exhibit 9
12 Steps of the Functional Analysis
Considered in the Property Unit PSRP Estimate

1	**Gather and review all relevant property unit owner/operator legal documents**
	(This step includes documents regarding organization structure, legal firm, tax status, and owners—e.g., shareholder, partnership, LLC member—agreements.)
2	**Gather and review all relevant property unit owner/operator organization charts**
	(This step includes both personnel reporting charts and functional relationship clients and considers both entity governance procedures and quality, quantity, tenure, and experience of entity/function leaders.)
3	**Understand and document the products/services design, R&D, and products/services differentiation functions**
	(This step includes the assessment of how the taxpayer property unit's products or services are developed and how these products or services are intended to address their competition in the relevant marketplace.)
4	**Understand and document the materials, labor, and overhead procurement function**
	(This step includes consideration of how and when the taxpayer property unit procures all of its materials, labor, and overhead inputs—for entities in every type of industry or profession.)
5	**Understand and document the products/services production function**
	(This step includes the assessment of how the taxpayer property unit processes all of its material, labor, and overhead components to produce a product or a service—including the quality control of the product or service production.)
6	**Understand and document the inventory and products/services storage function**
	(This step includes both the in-process and finished inventory of goods and the in-process and finished inventory of services.)
7	**Understand and document the sales and marketing function**
	(This step includes the assessment of the taxpayer property unit products or services pricing, packaging, advertising, promotional, trademark development and protection, and other branding—on a stand-alone basis and in response to competitive products and services.)
8	**Understand and document the shipping and distribution logistics function**
	(This step includes consideration of how the taxpayer property unit products or services are delivered to the customer or the client—including freight, insurance, returns, warranty and repairs, and other expenses.)
9	**Understand and document the accounting, finance, information systems, human resources, legal, and other administration functions**
	(This step includes the assessment of how (a) information is generated and used throughout the taxpayer organization, (b) human resources are developed and administered, (c) financial statements and operational documents are prepared and used, (d) how cash management and treasury operations are performed, and (e) how the taxpayer company is capitalized with debt and equity capital sources.)
10	**Assess and document the taxpayer property unit owner/operator strategic position in comparison to competitors in the relevant industry or profession**
	(This step includes (a) measurement of the taxpayer property unit's market share/selective market share, market size, and market growth rate; (b) evaluation of the taxpayer property unit's customer or client needs; and (c) assessment of the entity's competitive strengths, weaknesses, opportunities, and threats.)
11	**Describe and document the assets used by the taxpayer property unit owner/operator to perform the functions**
	(This step includes a listing, description, and assessment of relative importance/contribution of (a) all working capital accounts, (b) all tangible property types and accounts—owned and leased, (c) all general intangible property types and accounts—owned and licensed, and (d) all intellectual property types and accounts—owned and licensed.)
12	**Evaluate and document the risks assumed by the taxpayer property unit owner/operator to perform the functions**
	(This step includes a listing, description, and assessment of all products/services liability, operating language, financial leverage, environmental, supply dependence, customer dependence, technology dependence, employee dependence, intellectual property dependence, tax litigation, commercial litigation, credit and collection, inventory control, property and casualty, foreign exchange, market/competitor, and other risks.)

similar considerations should be made with regard to the (1) validity of the investment-specific risk premium, (2) the legal/statutory limitations on the use of an investment-specific risk premium, and (3) appropriate level of the subject- investment-specific risk premium.

10. The inclusion of a PSRP in an analyst's assignment is not necessarily limited to valuations. The PSRP may also be applied in damages measurements, transfer price analyses, and numerous other analyst engagements.
11. Rolf W. Banz, "The Relationship between Return and Market Value of Common Stocks," *Journal of Financial Economics* (March 1981).
12. Roger J. Grabowski, "The Size Effect Continues to Be Relevant When Estimating the Cost of Capital," *Business Valuation Review* 37, no. 3 (Fall 2018): 94
13. Duff & Phelps *2017 Valuation Handbook— U.S. Guide to Cost of Capital*, 8.
14. Ibid., 8-1.
15. Duff & Phelps 2019 Cost of Capital: Annual U.S. Guidance and Examples, Cost of Capital Navigator, 12.
16. Ibid.
16. Ibid., 15.
17. Jim Hitchner, "How to 'Rig' a Valuation: The Discount Rate," *Financial Valuation and Litigation Expert* (February/March 2013).
18. Moody's "Rating Scale and Definitions."

Connor Thurman is a manager in our Portland, Oregon, practice office. He can be reached at (503) 243-7514 or at cjthurman@willamette.com.

Robert Reilly is a managing director in our Chicago practice office. He can be reached at (773-399-4318) or at rfreilly@willamette.com.