

Unit Valuation Insights

CAPM AND CAPITALIZATION RATE ISSUES IN AD VALOREM TAX UNIT VALUATIONS

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In many industries, taxpayer corporation real estate and tangible personal property are assessed in aggregate using the unit valuation method. In such unit valuations, the taxing authority assessor often uses an income approach valuation method. The property tax assessor may use either the direct capitalization method or the yield capitalization method of the income approach to collectively value all of the taxpayer corporation operating assets. The capital asset pricing model (CAPM) is often used to estimate the present value discount rate (or yield capitalization rate) in an income approach unit valuation of taxpayer operating assets. However, the CAPM was developed to estimate the appropriate discount rate for the valuation of publicly traded equity securities as part of a diversified investment portfolio of equity securities. Therefore, CAPM is often misapplied to estimate the appropriate discount rate for the unit valuation of taxpayer corporation operating assets for ad valorem tax purposes.

INTRODUCTION

For unit valuation purposes, the selected cost of equity capital is an important valuation variable in both the direct capitalization method and the yield capitalization method. Both the direct capitalization method and the yield capitalization method are commonly used for the collective—or unit—valuation of taxpayer corporation real estate and tangible personal property operating assets.

In this discussion, we focus on the conceptual limitations and application weaknesses of using CAPM for the unit (or collective) valuation of an undiversified portfolio of nonmarketable real estate and tangible personal property operating assets. We also review several alternative cost of equity capital models.

INTRODUCTION TO CAPM

The development of the CAPM was a significant financial economics breakthrough in the 1960s. Arguably, the CAPM is considered the most important univariate model to describe cost of equity capital decisions.

The CAPM was introduced by Jack Treynor, William Sharpe, John Lintner, and Jan Mossin independently, building on the earlier work of Harry Markowitz on diversification and modern portfolio theory. In 1990, Sharpe, Markowitz, and Merton Miller received the Nobel Memorial Prize in Economics for their contribution to the field of financial economics related to the development of the CAPM.

The CAPM was (and still is) considered an important model to estimate the required rate of return on a short-term investment in perfectly liquid equity securities as part of a diversified portfolio of liquid investment securities. CAPM is one method (and, certainly, it is a widely accepted method) for quantifying the cost of equity capital component of an overall income capitalization rate.

With respect to publicly traded equity securities, the basic CAPM formula is presented as follows:

$$k_e = R_f + B_j(R_m - R_f)$$

where:

k_e = the concluded cost of equity capital

R_f = the risk-free rate of return

R_m = the expected overall rate of return for a broad-based equity market portfolio

B_j = the beta coefficient of the subject publicly traded equity security “j”

Basic CAPM theory indicates that the nonsystematic risk of a subject security is not relevant to diversified investors in publicly traded equity securities. That is, because the nonsystematic component of investment risk could be diversified away in a well-managed, diversified portfolio of liquid investment securities, investors do not consider such risk in their expected rate of return decisions.

In the theoretical state of market equilibrium, a liquid equity security will be expected to provide a rate of return commensurate with its level of systematic risk. This component of total investment risk is the risk that cannot be avoided through efficient portfolio diversification. The greater the level of unavoidable systematic risk of a particular investment security, the greater the rate of return that an investor will expect from that investment security.

The relationship between the expected rate of return and the level of unavoidable systematic risk is the conceptual foundation of CAPM.

The use of CAPM to estimate a required cost of equity capital implicitly encompasses the acceptance of the following assumptions:

1. Capital markets are highly efficient.
2. Investors are well informed.
3. Transaction costs are zero.
4. There are negligible restrictions on investment.
5. There are no income or transfer taxes.
6. No investor is large enough to affect the market price of the subject stock.

The CAPM is also based on the assumption that investors are in general agreement about the likely performance and the risk of individual equity securities. In addition, the CAPM is based on the assumption that investors' return expectations are based on a common investment holding period of, say, one year.

Under this set of hypothetical conditions, investors perceive the opportunity set of risky equity securities in the same way. And, investors will devise similar (and similarly diversified) investment portfolios.

The more the subject valuation assignment differs from this set of hypothetical assumptions, the more important are the individual company-specific, or nonsystematic, risks of an investment in the subject taxpayer corporation.

The valuation analyst should remember that CAPM assumes that this investment-specific risk can be diversified away. If the subject-specific risk cannot be diversified away, then certain conceptual and practical implications of the CAPM model do not hold up under analytical scrutiny.

WEAKNESSES OF USING CAPM IN AD VALOREM TAX PROPERTY VALUATIONS

A fundamental weakness of using CAPM to estimate a capitalization rate for ad valorem tax unit valuation purposes is whether a theory developed for understanding the value of liquid equity securities within a diversified portfolio is

applicable for understanding the value of illiquid operating assets in a nondiversified taxpayer corporation.

Different categories of investment assets are subject to different degrees of risk. The CAPM was developed to estimate the fair rate of return on a relatively short-term investment in publicly traded equity securities. The CAPM was not developed to estimate the capitalization rate on a long-term investment in the controlling ownership interest in illiquid operating assets of an individual corporation.

These different categories of investment assets (i.e., liquid equity securities versus illiquid operating assets) are subject to different degrees of risk. Therefore, different categories of investment assets have different expected rates of investment return.

For example, equity securities change hands regularly and rates of return are closely followed in the public stock markets.

On the other hand, tangible operating assets—such as real estate and tangible personal property—are a fundamentally different type of investment asset than marketable securities. While there are markets for real estate and tangible personal property, they are not as efficient as the stock markets. Therefore, tangible operating assets are not as liquid as marketable securities.

Table 1 illustrates the fundamental differences between (1) the market for public securities exchange transactions and (2) the market for real estate and tangible personal property exchange transactions. These fundamental structural differences in marketplace mechanics—particularly with regard to marketplace efficiency—explain why CAPM is appropriate for estimating an investor's required rate of return on public security investments—but less appropriate for estimating an investor's required rate of return on real estate or personal property operating assets.

Table 1 provides a few of the reasons why efficient and organized public securities markets are fundamentally dissimilar from inefficient and unorganized markets for real estate and personal property asset transactions.

Beta Measurement Problems

Another fundamental application weakness related to the use of CAPM for unit valuation purposes relates to the measurement of the various components of the CAPM equation. That is, there is no single accepted data source or method for measuring the beta coefficient component of the model.

First, different financial reporting services provide different beta estimates—both for the same industry and for the same individual security. Valuation analysts often review many financial reporting services beta estimates in order to estimate a particular beta.

Table 1
Structural Differences Between Markets in which Public Securities
and Real Estate/Tangible Personal Property Assets Transact

Exchange Market Attributes	Publicly Traded Securities Transaction Market	Real Estate/Tangible Personal Property Operating Assets Transaction Market
1. Property types that are competing for investment funds	Homogeneous	Heterogeneous
2. Number of buyers and sellers	Many	Few buyers and sellers
3. Transaction prices	Low	Unpredictable and relatively high
4. Cost of individual transactions (including brokerage, information, title transfer, and other fees)	Low	High
5. Government restrictions on secondary market participants	Few	Regulations at all levels
6. Supply of and demand for the subject properties	Fairly balanced	Volatile demand
7. Type of buyers and sellers	Genuinely informed	Potentially uninformed, lacking transaction experience
8. Type of disclosure of financial and operational information	Public	Restricted disclosure (if any) or limited financial or operational information
9. Type of market mechanism to process the transaction	Relatively seamless	Small, fragmented, overlapping processing
10. Type of subject properties	Liquid	Illiquid

Second, different financial reporting services may use different market indices to calculate beta. For example, some financial reporting services use the Standard & Poor's 500 as the benchmark market index. And, some financial reporting services use the New York Stock Exchange index as the benchmark index.

Third, some financial reporting services use weekly, monthly, or semi-monthly observations. Some financial reporting services make their observations on the last trading day of each month. Some financial reporting services make their observations on the last Friday of each month (or of each week).

Procedural differences in data collection—particularly the differences between weekly observations and monthly observations—may have a material impact on the estimation of the beta for the same security.

Therefore, with these procedural issues related to beta measurement, the valuation analyst is often uncertain about:

- the correct beta for the selected guideline companies and
- the correct beta for the subject taxpayer corporation.

Consideration of Assets Not Yet in Place as of the Valuation Date

There is another problem with the use of CAPM to estimate the cost of equity capital for unit valuation analysis. That problem is that the associated unit valuation method and the resulting value indication will typically include the values of assets not yet in place as of the valuation date.

Since CAPM implicitly incorporates investor's expectations of security appreciation—that is, investment growth—it imparts a value to the expected return from future investments in both future tangible assets and future intangible assets. These future assets represent taxpayer corporation assets not yet in existence as of the valuation date.

Because empirical data used in a CAPM analysis are market derived, they indicate a consensus of investor expectations regarding the prospective performance of either (1) the subject investment or (2) the guideline investments. If the subject taxpayer corporation is successful, then these investor expectations will include the present value of future returns for two types of taxpayer business enterprise assets that may not be the subject of the unit valuation: (1) goodwill intangible personal property and (2) expected future capital expenditures in real estate and tangible personal property.

Goodwill is commonly referred to as the present value of future income from future tangible assets and intangible assets. Goodwill may represent the present value of future new customers. Future customers are unidentified customers that the subject taxpayer business may serve at some point in the future (as opposed to expected recurring income from identifiable repeat customers).

And, while investor expectations of future income from new customers is an important component of a going-concern business enterprise, the associated goodwill intangible asset represents the intangible value of future business relationships that do not yet exist (and are not subject to specific identification) as of the valuation date.

In their public security pricing decisions, investors may also impart a value to the positive net present value of the future capital expenditures of the subject taxpayer corporation. A positive net present value occurs when the taxpayer corporation expects to earn a rate of return on its investment greater than its cost of capital. The investor expectations of future capital expenditures may, themselves, have two components: (1) future merger and acquisition activity of the subject taxpayer corporation and (2) future investments in plant, property, and equipment at the subject taxpayer corporation.

It is reasonable for investors to expect that the competent management of the subject taxpayer corporation will continue to make new net investments (i.e., expenditures greater than that required to simply replace worn out assets) in order to expand the taxpayer business, for example, in new locations and with new product lines and services.

Investor expectations regarding future investments in capital expenditures are perfectly reasonable. However, unit valuations that incorporate these expectations (through CAPM or other analytical means) will include the present value of capital expenditures for tangible assets (and/or mergers and acquisitions) that do not yet exist at the taxpayer corporation unit as of the valuation date.

Difficulty in Adjusting CAPM for Measures of Economic Income Other Than Net Cash Flow

The economic benefit measurement associated with CAPM is net cash flow available to equity investors. It is difficult for the valuation analyst to adjust CAPM in order to estimate the required rates of return commensurate with measures of economic income other than net cash flow available to equity investors.

For example, CAPM cannot be easily adjusted to accommodate pretax net income, net operating income, operating cash flow, or other measures of economic income—other than the measure of net cash flow available for distribution to stockholders.

Difficulty in Applying Guideline Company Betas to the Subject Taxpayer Corporation Valuation

There are difficulties in using publicly traded guideline companies to estimate a taxpayer corporation beta. The valuation analyst may have to make numerous adjustments when applying betas that are estimated from selected guideline companies to the unit valuation of the subject taxpayer corporation. Such possible adjustments are due to the following:

- difficulties that arise when the subject taxpayer corporation has a single line of business and the selected guideline companies are not pure-play
- different degrees of product or service diversification
- inherent differences between a publicly traded guideline company and the closely held subject taxpayer corporation
- different degrees of leverage between guideline companies (or the industry average company) and the subject taxpayer corporation

OTHER MEASURES OF THE COST OF EQUITY CAPITAL

First, when the valuation analyst elects to use the CAPM in the subject unit valuation, the valuation analyst should consider the use of the modified capital asset pricing model (MCAPM)—in contrast to the basic CAPM.

The MCAPM is an extension of the basic CAPM. The modified version includes alpha factors which allow an analyst to incorporate nonsystematic cost of equity risk adjustments. Nonsystematic adjustment alpha factors include: a risk premium related to size (as empirically supported, small companies exhibit more risk) and a company-specific company risk premium (nondiversifiable company risk).

Second, several alternatives to CAPM are available for estimating the cost of equity capital in either a direct capitalization method or yield capitalization method unit valuation.

The following alternative cost of equity capital methods should be considered by the valuation analyst:

- the build-up model—(the risk-free rate of return + a general equity risk premium + an industry risk premium adjustment + a size risk premium + a subject-specific risk premium)
- the cost of debt plus equity risk premium model—(the cost of debt for the subject taxpayer corporation + a market-derived equity risk premium)

- the DCF model—(the sum of the dividend yield + the capital gain yield for the selected guideline companies)
- the arbitrage pricing theory method

All of these alternative cost of equity capital methods, however, also have their own analytical strengths and weaknesses. Furthermore, none of these alternative cost of equity capital methods “corrects” all the analytical problems related to the use of CAPM in an ad valorem tax unit valuation.

UNIT VALUATION METHODS THAT MITIGATE SOME OF THE CAPM ANALYTICAL PROBLEMS

The conceptual and practical problems with the use of CAPM may be increased when the valuation analyst uses the constant growth yield capitalization method in the unit valuation of taxpayer corporation operating assets. The conceptual and practical problems with the use of CAPM are decreased when the valuation analyst uses the following valuation methods in the unit valuation of taxpayer corporation operating assets:

1. A cost approach valuation method, including the aggregate valuation of all taxpayer corporation real estate and tangible personal property.
2. A yield capitalization method that assumes no future growth in the subject unit economic earnings. The implicit assumption in the use of this yield valuation method is either:
 - a. capital expenditures equal annual depreciation expense (so that taxpayer corporation operating assets are constantly replaced but not increased in the valuation model) or
 - b. the expected rate of return on the incremental new capital expenditures equals the taxpayer corporation’s weighted average cost of capital (and, therefore, these incremental capital expenditures do not increase the taxpayer unit value).
3. A direct capitalization method that assumes no future growth in the subject unit economic income. The implicit assumption in the use of this direct capitalization method is that the annual depreciation expense exactly equals the prospective capital expenditures. Based on this assumption, the valuation model has a stable asset base.

The following factors should be considered in the use of any unit valuation direct capitalization method:

- a. The naïve use of selected guideline company earnings/price (E/P) pricing ratios is typically inappropriate in the estimation of a direct capitalization rate for unit valuation analyses. This is because

guideline company E/P pricing ratios consider both income yield and expected capital appreciation.

The naïve use of selected guideline company E/P pricing ratios will typically include in the subject unit valuation the value of taxpayer corporation operating assets not yet in existence as of the valuation date.

- b. Public security investors demand a return of and a return on their equity investments. Investors sell their equity investments after a defined investment holding period, and they expect to enjoy appreciation in the value of their equity investments. This appreciation typically does not occur with regard to the taxpayer corporation industrial and commercial operating assets subject to unit valuation.
- c. The rates of return that a taxpayer corporation can earn on its operating assets should be adjusted if these rates of return are to be compared to the rates of return earned by equity investors on their publicly traded securities.

Taxpayer corporations do not sell their “investment portfolios” of operating assets after a defined holding period as equity investors do. And, taxpayer corporations generally do not enjoy appreciation in their “investment portfolios” of operating assets, as equity investors do.

SUMMARY AND CONCLUSION

This discussion identified some of the valuation analyst issues with respect to using CAPM for ad valorem tax unit valuation purposes. It was not the objective of this discussion to identify all of the solutions to these issues.

In fact, there are many issues related to estimating the cost of capital for use in the valuation of illiquid, nondiversified operating assets. The most significant issue in using CAPM is that the CAPM model was developed for the valuation of perfectly liquid, diversified publicly traded securities.

With that in mind, the valuation analyst should consider that the objective of the unit valuation is to value the taxpayer corporation taxable operating assets and not to value the taxpayer corporation marketable security instruments.

Of equal importance, the valuation analyst should keep in mind that the objective of the ad valorem tax valuation is to value the taxpayer corporation operating assets in place on the valuation date. Estimating the present value of the prospective income to be generated from future tangible assets and future intangible assets not yet in existence as of the valuation date is inappropriate to the objective of the ad valorem tax unit valuation.

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