

## ESTIMATING DISCOUNT RATES AND CAPITALIZATION RATES

Timothy J. Meinhart

### INTRODUCTION

In intellectual property analysis, the terms "discount rate" and "capitalization rate" are often used interchangeably. Such use is an error. The terms discount rate and capitalization rate, although related, are not synonyms. However, the terms (1) discount rate, (2) present value rate, (3) present value discount rate, and (4) yield capitalization rate are all synonyms. And the terms capitalization rate and direct capitalization rate are synonyms.

The experienced analyst should fully understand (1) the important distinction between the terms discount rate and capitalization rate and (2) how to properly use each "rate of return" within a selected analytical approach and method.

Within any income approach analysis, the analyst may use either a discount rate or a capitalization rate to convert some projected level of economic income to an estimate of value, value decrement (i.e., damages), or transfer price. Before we discuss how a discount rate or a capitalization rate is used in intellectual property analysis, we will first review (1) how a discount rate differs from a capitalization rate and (2) when it is appropriate to use each. Next, we will discuss the different methods for estimating discount rates and capitalization rates.

### DISCOUNT RATE VERSUS CAPITALIZATION RATE

Both a discount rate and a capitalization rate represent a risk-adjusted rate of return that an investor would expect on a given investment. Both rates of return take into account the risks and uncertainties associated with the economic income stream that is projected for the subject asset, property, or business interest. Although these two different rates of return are used in two different income-based analytical methods, the two methods should produce complementary results—if they are properly applied.

A discount rate is often thought of in the context of a discounted cash flow analysis. In a discounted cash flow analysis, the analyst typically projects a stream of cash flow (or a similar measure of economic income) to be generated by the subject intellectual property. This economic income stream is typically projected over the subject's expected RUL.

In the analysis of a going-concern business enterprise, the projection of the economic income stream may extend beyond a discrete projection period. This residual/terminal value calculation is intended to capture the incremental/decremental

amount of economic income that extends beyond the discrete projection period. This residual/terminal value calculation reflects the fact that a business enterprise normally has a perpetual RUL.

In contrast, an intellectual property frequently has a finite RUL. An intellectual property income approach may incorporate a residual/terminal value analysis. However, that analysis should reflect the intellectual property finite life instead of the business enterprise infinite life.

A discounted cash flow analysis is performed by discounting (1) the projected economic income for the discrete projection period and (2) the terminal effect at the conclusion of the discrete projection period. Both the discrete projection and the terminal effect are present valued to the analysis date by use of a required rate of return, or a discount rate. In using a discounted income analysis, it is important to note that:

- the discount rate reflects the required annual rate of return that a hypothetical investor would expect to earn on the projected income stream to support the indicated value/damages/transfer price estimate, and
- the discount rate does not incorporate a constant rate of growth for the projected income stream; rather, this rate of growth, which may vary during the projection period, is reflected in the periodic income projections.

One of the primary benefits of using the discounted cash flow analysis is that it allows income that is projected to increase (or decrease) at varying rates over time. Different scenarios reflecting alternative projected levels of income can be analyzed with a selected discount rate.

Unlike a discount rate, a capitalization rate is used in the analysis of economic income that is projected either to (1) remain constant or (2) increase at a constant rate over time. In instances where the projected income is expected to increase at a constant rate over time, the capitalization rate is equal to the discount rate minus the expected growth rate.

For example, if the discount rate appropriate to the analysis is 20 percent, and the expected economic income growth rate is 5 percent, then the corresponding capitalization rate is 15 percent. In other words, the algebraic relationship between these two rates is: discount rate minus expected growth rate equals capitalization rate. In this example, the algebraic relationship is expressed as:  $20\% - 5\% = 15\%$ .

In instances when the projected income is expected to decrease at a constant rate over time, the capitalization rate is equal to the discount rate minus the negative growth rate. In other words, the algebraic relationship between these two rates is: discount rate minus negative expected growth rate equals capitalization rate. For example, if the appropriate discount rate is 20 percent and the expected economic income growth rate is minus 5 percent (meaning an annual decrease of 5 percent), then the corresponding capitalization rate is 25 percent. In this example, the algebraic relationship is expressed as:  $20\% - (-5\%) = 25\%$ . In instances when the projected income will remain constant over time, then the capitalization rate is equal to the discount rate.

### ESTIMATING DISCOUNT AND CAPITALIZATION RATES

The empirical market data used to estimate the discount rate or capitalization rate will influence the selected measure of economic income. In other words, if the discount rate is extracted from market data regarding the net cash flow of sale/license transactions, then it is appropriate to apply the selected discount rate to the net cash flow of the subject intellectual property. In contrast, if the discount rate is extracted from market data regarding the net income of sale/license transactions, then it is appropriate to apply the selected discount rate to the net income of the subject intellectual property.

When analyzing an intellectually property, it is common to focus on net cash flow as the appropriate measure of economic income. This is because most of the empirical market evidence used to estimate discount rates and capitalization rates is calculated based on net cash flow. To develop a better understanding of how these empirical market data are used in estimating discount rates and capitalization rates, we will next discuss various methods for estimating a discount rate.

If a market-extracted discount rate (i.e., a rate extracted from arm's-length intellectual property sale/license transactions) is not available, the discount rate applicable to a business enterprise is often used as a proxy for the appropriate rate of return. The intellectual property and the business enterprise owner/operator are assumed to be similar in that much of their value (in the case of the intellectual property, all of its value) is intangible in nature. In order to compensate an investor for the level of risk associated with owning an intellectual property, analysts often use either a business enterprise cost of equity capital or weighted average cost of capital as a proxy for the appropriate intellectual property discount rate.

### CAPITAL ASSET PRICING MODEL

There are several methods available for estimating the cost of equity capital. The first, and probably the best-known, method is the capital asset pricing model (CAPM).

The CAPM, developed by William Sharpe in 1964, is viewed as a significant breakthrough in modern financial economics. The CAPM was designed to predict the relationship between (1) the risk of an asset and (2) its expected return. While the CAPM was originally developed for the analysis of marketable securities, analysts have found the CAPM to be a practical method for estimating the expected rate of return for assets that do not trade in a public marketplace.

The CAPM recognizes that every investment carries two distinct risks. These risks are defined as (1) systematic risk and (2) unsystematic risk. Systematic risk is the risk associated with the market in general, or in other words, a risk that cannot be eliminated through diversification. This measure of systematic risk is often referred to as "beta." The second type of risk—unsystematic risk—is specific to the particular investment or asset. In contrast to systematic risk, unsystematic risk is often mitigated through diversification.

While the CAPM is relatively easy to apply, an analyst should understand the underlying assumptions of the model. These assumptions include:

1. Investors are risk adverse.
2. Rational investors seek to hold efficient portfolios—in other words, portfolios that are fully diversified.
3. All investors have identical time horizons.
4. All investors have identical expectations about expected rates of return.
5. All investors pay no taxes on returns and incur no transaction costs.
6. The rate received for lending money is the same as the cost of borrowing money.
7. The market has perfect divisibility and liquidity.

The CAPM is based on the premise that a rational investor expects to earn a rate of return greater than a risk-free rate of return when investing in an asset, property, or business interest that has greater risk than a risk-free investment. This incremental rate of return that compensates the investor for accepting a greater level of investment risk is called a risk premium.

The CAPM was originally developed to analyze and estimate rates of return on capital market equity securities. The CAPM is most often used to analyze and estimate rates of return on investments in capital market equity securities. Therefore, in the statement of the CAPM, this investment risk premium is most often called an equity risk premium.

The CAPM equation is expressed as follows:

$$E(R_i) = R_f + B(RP_m)$$

where:

$E(R_i)$  = Expected rate of return (cost of equity capital for an equity security) for a given asset, property, or business interest investment  $i$

$R_f$  = Rate of return on a risk-free investment

$B$  = Beta

$RP_m$  = Risk premium for the market in which the subject investment trades (e.g., an equity risk premium is based on the capital market for equity securities)

The risk-free rate of return is often represented by the yield on a U.S. Treasury bond, which is considered to have virtually no default risk.

The equity risk premium is one measure of the incremental return needed to compensate an investor for assuming a level of investment risk greater than that of a risk-free investment. Within the CAPM, this equity risk premium is adjusted by beta ( $B$ )—a measure of systematic, market-wide risk. The beta coefficient in the CAPM takes into account the sensitivity of the return on the subject investment to movements in the returns of the marketplace as a whole.

Beta, the measure of systematic risk, is a function of the relationship between (1) the return on an individual security and (2) the return on the market—measured by a broad market index such as the Standard and Poor's 500, the New York Stock Exchange Composite, the Russell 1000, Russell 2000, and so on. Given that there are multiple data sources used for estimating beta—and no single accepted source—there are often problems with beta comparability and beta measurement. These measurement problems result from different (1) data sources, (2) measurement intervals, and (3) measurement time periods.

Due to the differences in how the various services calculate beta, it is common to have two (or more) financial reporting services calculate a different beta for the same security at any point in time.

When using the CAPM to estimate the required rate of return, the analyst is confronted with the problem of identifying a reasonable measurement of the beta. The analyst has a number of solutions to solve this problem, including:

1. The analyst can use the beta of the company that owns the intellectual property as a proxy for the intellectual property beta that should be used. This method of estimating a beta assumes that the subject intellectual property is owned by a company that has publicly traded equity securities. It also assumes that the publicly traded securities are traded frequently enough to allow for the calculation of a beta.
2. The analyst can rely upon a composite beta for publicly traded companies that (a) operate in the same industry as

the company that owns the subject intellectual property and (b) have similar intellectual properties.

3. The analyst can rely upon a composite beta for publicly traded companies that own a significant number of intellectual properties that are similar to the subject intellectual property, even though these publicly traded companies may not necessarily operate in the subject's industry.

While all of the situations described above assume that the subject intellectual property is owned by a company, there are situations where the intellectual property is owned by an individual. In these situations, it is not possible to assess a beta for the individual owner/operator. As a result, the analyst is often required to research the overall systematic risk that is inherent in the publicly traded companies that are the logical users of the subject intellectual property. This analysis would involve an evaluation of the betas of the publicly traded companies that could benefit from licensing the subject patent, copyright, trademark, or trade secret.

A widely used market risk premium used in the CAPM is the long-horizon equity risk premium calculated by Ibbotson Associates. The premium is calculated as the difference between (1) the historical large company stock total return and (2) the historical income return on long-term government bonds. The equity risk premium is expressed as follows:

$$RP_m = TR_{lcs} - IR_{ltb}$$

where:

$RP_m$  = Risk premium for the market in which the subject investment trades (e.g., an equity risk premium is based on the capital market for equity securities)

$TR_{lcs}$  = Total return on large company stocks

$IR_{ltb}$  = Income return on long-term U.S. government bonds

For purposes of this calculation, Ibbotson Associates measures the return on large company stocks as the historical total return on the S&P 500. The measurement for the income return on long-term government bonds relates to the historical income return generated by U.S. government bonds with a maturity near 20 years.

While the CAPM is particularly useful in estimating rates of returns on publicly traded equity securities, the model has limitations when used to estimate the required rate of return on an intellectual property investment. Some of these CAPM limitations include the following:

- The CAPM was developed for purposes of the valuation/pricing of publicly traded securities—principally equity securities; the CAPM was not developed for use in

performing economic analyses of non-publicly traded intellectual properties.

- A fundamental component of the CAPM is beta, which can be easily measured from readily available capital market pricing data when valuing/pricing an equity security. In contrast, there are no comparable market data for use in the measurement of the intellectual property beta.
- The CAPM is based on the premise that an investor expects to earn an equity risk premium associated with an investment in an equity security that has greater risk than a risk-free investment. The measurement of this equity risk premium is usually based on the historical rates of return of a broad index of equity securities. While this equity risk premium is appropriate for equity security analysis, an additional risk premium may be appropriate if the intellectual property has greater risk than the business that owns/operates the intellectual property.

While the above equation represents the CAPM in its basic form, the model has been refined over the years to reflect the additional risk normally associated with investments other than publicly traded equity securities. Such model refinements include adding various risk premiums for (1) the size of the subject investment, (2) the illiquidity of the subject investment, and (3) various investment-specific, nonsystematic risk factors. For intellectual property analysis, the basic CAPM may be expanded to include consideration of a risk premium associated with an intellectual property investment. Such an intellectual property-related risk premium should be based on:

- the type of the subject economic analysis (i.e., valuation, damages, or transfer pricing);
- the type of intellectual property subject to analysis (i.e., copyright, patent, trademark, trade secret, etc.);
- industry factors related to the current or expected use of the intellectual property;
- the remaining useful life of the subject intellectual property;
- competition related to the availability/use of alternative intellectual properties;
- competition related to the development/commercialization of new intellectual properties;
- competition for the business enterprise owner/operator of the intellectual property;
- innovation/obsolescence of the subject intellectual property (and vis-à-vis potential or actual competitive intellectual properties); and
- other relevant factors.

By considering these and other factors, the basic CAPM equation is expanded as follows:

$$E(R_i) = R_f + B(RP_m) + RP_{ip}$$

where:

$E(R_i)$  = Expected rate of return for a given investment  $i$

$R_f$  = Rate of return on a risk-free investment

$B$  = Beta

$RP_m$  = General equity risk premium, extracted from the general capital markets

$RP_{ip}$  = Additional risk premium associated with intellectual property-specific factors

An Ibbotson-derived equity risk premium may be sufficient for use in the CAPM when estimating the required rate of return on an equity security, but it may not capture all of the incremental risk (and resulting high required return) that is inherent in an intellectual property. As a result, an analyst will routinely incorporate an additional risk premium that is specific to the subject intellectual property.

Based on a comparison of the characteristics of (1) an intellectual property and (2) a typical equity security, it is often the case that an intellectual property will warrant a required rate of return that is higher than the rate of return derived for a publicly traded equity security. While this concept seems intuitive, the quantification of the exact intellectual property-specific risk premium is not so straightforward.

Unlike equity securities, intellectual properties have limited useful lives. Intellectual properties are generally considered to be more risky than equity securities. In contrast, the (1) commercialization and license potential and (2) legal protection/judicial standing associated with intellectual properties generally makes them less risky than other intangible assets.

As a result, the required rate of return for an intellectual property normally ranges from (1) a low that is equivalent to the required rate of return on the equity securities of the company that owns the intellectual property to (2) a high that is equivalent to the required rate of return on the company's other intangible assets.

It is important to note that there is no specific model or formula for quantifying the exact intellectual property-specific risk premium. Ultimately, the adjustment to the required rate of return is based on the analyst's experience and judgment.

## THE BUILD-UP MODEL

A second method for estimating the discount rate for an intellectual property analysis is the build-up model. The build-up

model is a conceptual cousin to the CAPM in that it includes (1) a risk-free rate of return and (2) many of the same equity risk premium components as the CAPM. A primary difference between the two methods is that the build-up model does not include a beta factor to capture the element of systematic risk.

Algebraically, the build-up model is expressed as follows:

$$E(R_i) = R_f + RP_m + RP_s + RP_{ip}$$

where:

$E(R_i)$  = Expected rate of return (e.g., cost of equity capital for an equity security) for a given investment  $i$

$R_f$  = Rate of return on a risk-free investment

$RP_m$  = Risk premium for the market in which the subject investment trades

$RP_s$  = Risk premium related to size

$RP_{ip}$  = Risk premium related to intellectual property-specific factors

The above build-up model includes a risk premium related to investment size. While the basic CAPM does not include this size-specific risk premium, it should be noted that the basic CAPM has been modified over the years to include consideration of a risk premium for investment size.

Analysts typically incorporate a risk premium for investment size when valuing the equity securities of small capitalization companies. However, such a size-related risk premium is not as commonly used in intellectual property analysis.

Given the conceptual similarities between the CAPM and the build-up model—and ignoring the risk premium related to investment size—it is noteworthy that the two methods produce identical discount rate conclusions when the beta factor (explicit in CAPM, implicit in build-up model) is equal to one.

Like the CAPM, the build-up model estimates a cost of equity capital. Therefore, a discount rate derived from the build-up model corresponds to the measure of income available to an investor in equity securities. In order to be consistent in our matching of (1) the discount rate and (2) the stream of economic income, it is crucial that the discount rate derived from the build-up model be applied to the appropriate income stream (i.e., after-tax cash flow). This would also hold true if the build-up model is expanded to encompass an intellectual property-specific risk factor.

As with a CAPM discount rate, a build-up model discount rate may be converted to a capitalization rate and used in a direct capitalization analysis. The use of a direct capitalization rate—as opposed to a discount rate—would be appropriate in situations where (1) the economic income of the trade name is estimated to either (a) remain unchanged or (b) increase/decrease at a constant rate during the capitalization period and (2) the remaining useful life of the trade name is expected to be so long that the projected economic income can be analyzed as an annuity in perpetuity.

It is noteworthy that the sources used to estimate the equity risk premium in the CAPM are identical to the sources used to estimate the equity risk premium in the build-up model. As previously mentioned, the most widely used sources for this particular premium are the Ibbotson Associates publications.

The application of an intellectual property-specific risk premium using the build-up model is identical to the application using the CAPM. There is no specific model or formula for quantifying the intellectual property-specific risk premium. The adjustment to the required rate of return is based on the analyst's experience and judgment.

In recent years, Ibbotson Associates has made advances in modifying the build-up model to include an industry-specific risk factor. The modifications include using beta information from companies that participate in a particular industry to evaluate the risk characteristics of that particular industry. The Ibbotson Associates calculations resulted in a series of industry premiums that are categorized by standard industrial classification (SIC) codes. These premiums, as cited in *Stock, Bonds, Bills, and Inflation Yearbook—Valuation Edition*, are used in conjunction with the build-up model—to estimate the cost of capital.

Algebraically, the build-up model, as modified for an industry-specific premium, is expressed as follows:

$$E(R_i) = R_f + RP_m + RP_s + RP_i + RP_{ip}$$

where:

$E(R_i)$  = Expected rate of return (e.g., cost of equity capital for an equity security) for a given investment  $i$

$R_f$  = Rate of return on a risk-free investment

$RP_m$  = Risk premium for the market in which the subject investment trades

$RP_s$  = Risk premium related to size

$RP_i$  = Risk premium related to industry

$RP_{ip}$  = Risk premium related to intellectual property-specific factors

## SUMMARY AND CONCLUSION

This discussion explored the development of an intellectual property discount rate or capitalization rate. This discussion presented many of the fundamental analytical differences between (1) an intellectual property and (2) a going-concern business enterprise. This discussion also described how these analytical differences impact the estimation of a discount or capitalization rate. Finally, this discussion summarized several of the models commonly used to estimate an intellectual property discount or capitalization rate.

*Timothy J. Meinhart is a senior manager in our Chicago office. Tim can be reached at (773) 399-4331 or tjmeinhart@willamette.com. www.willamette.com.*