Issues in Estimating the Cost of Equity Capital

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In most forensic-related valuation analyses, one procedure that affects most valuations is the measurement of the present value discount rate. This discount rate analysis may affect the forensic-related valuation of private companies, business ownership interests, securities, and intangible assets. This discussion summarizes three models that analysts typically apply to estimate the cost of equity capital component of the present value discount rate: (1) the capital asset pricing model, (2) the modified capital asset pricing model, and (3) the build-up model. This discussion focuses on the cost of equity capital inputs that are often subject to a contrarian review in the forensic-related valuation.

Introduction

There are three generally accepted business valuation approaches: (1) the income approach, (2) the market approach, and (3) the asset-based approach. Each generally accepted business valuation approach encompasses several generally accepted business valuation methods.

An analyst should consider all generally accepted business valuation approaches and select the approaches and methods best suited for the particular analysis. This discussion focuses on the estimation of the present value discount rate ("discount rate") in the application of the income approach.

The general principle of the income approach is that the value of the subject interest is the present value of future economic benefits (typically, some measure of income) associated with the ownership or operation of the business interest. In order to calculate the present value of the expected future income, the analyst typically applies a discount rate.

By definition, the discount rate is a rate of return used to convert a future monetary sum into a present value.[1] The discount rate is often considered to be the opportunity cost of the investor.

In other words, the discount rate is the required rate of return to the investor for assuming the risk associated with a certain investment. The discount rate reflects prevailing market conditions as of the valuation date, as well as the specific risk characteristics of the subject business interest.

If the income available to the company's total invested capital is the selected financial metric, then the discount rate is typically measured as the weighted average cost of capital ("WACC"). Typically, the WACC is comprised of the after-tax cost of debt capital and after-tax cost of equity capital. This discussion focuses on the cost of equity capital component of the WACC.

The cost of debt capital component of the WACC is generally based on either of the following:

1. The effective interest rate that the subject company pays on its actual debt
2. An assumed interest rate commensurate with a benchmark corporate bond rate

The selection of the corporate bond rate should be informed by the risk profile of the subject company.

In other words, if a subject company has low growth prospects and low profit margins, its risk profile may be compared to a bond that is not at investment grade (rather than to an investment grade bond).

The cost of equity capital is typically estimated based on the application of several financial models. A description of all available models to estimate the cost of equity capital is beyond the scope of this discussion. This discussion focuses on three models that analysts often consider when developing a cost of equity capital:

1. The capital asset pricing model ("CAPM")
2. The modified capital asset pricing model ("MCAPM")
3. The build-up model ("BUM")

These models are described in the remaining discussion.

Cost of Equity Capital Estimation

Estimating a private company discount rate may be a challenging aspect of the business valuation.

To estimate the cost of equity capital for a private company, the analyst should be prepared to analyze the risk related to the subject company. This analysis includes the consideration of risk-based adjustments for size, industry, impact of economic factors, and company-specific (i.e., unsystematic) risk factors, such as markets served, management depth, product/service mix, succession planning, and projected risk.

Capital Asset Pricing Model

The CAPM is a frequently applied model to estimate the equity cost of capital for the publicly traded stock of a public company. The following discussion summarizes the basic components of the CAPM. This discussion also provides insight as to the underlying assumptions in the CAPM.

The CAPM is generally defined as follows:

> A model in which the cost of capital for any stock or portfolio of stocks equals a risk-free rate plus a risk premium that is proportionate to the systematic risk of the stock or portfolio.[2]

Simply stated, the CAPM reflects the relationship between (1) the risk of an asset and (2) its expected return. CAPM was originally developed for the analysis of publicly traded marketable securities. As described below, analysts have modified the CAPM to estimate the cost of equity capital applicable to securities that do not trade in a public market.

"[If] a subject company has low growth prospects and low profit margins, its risk profile may be compared to a bond that is not at investment grade. . . ."

The application of the CAPM provides for a direct correlation between the cost of equity capital and the risk associated with a particular investment. The CAPM considers two primary components of risk::

1. Systematic risk
2. Unsystematic risk

Systematic risk, also referred to as "market risk," is the risk associated with investing in the market as a whole and that cannot be eliminated through diversification.

Within the CAPM analysis, the systematic risk component is affected by the application of the "beta" component. The beta component of the CAPM measures the subject interest's sensitivity or correlation to the public equity market—typically measured by using a broad equity index. This variable measures the amount of systematic risk, or market risk, for the subject security.

The CAPM equation is typically expressed as follows:

$$E(Ri) = Rf + \beta \times (ERP)$$

where:

$E(Ri)$ = Expected return for an individual security (i)
Rf = Rate of return available on a risk-free security
β = Beta
ERP = Market-derived equity risk premium

The rate of return available on a risk-free security, or risk-free rate, reflects the minimum return that investors expect to receive from their investment, based on the expected rate of inflation and expectations of the real rate of interest. Analysts often use the yield on long-term U.S. Treasury bonds as a proxy for the risk-free rate.

The ERP is the rate of return an investor could expect over the risk-free rate by investing in a diversified market portfolio. This diversified market

portfolio is assumed to be perfectly liquid and the same for all investors.

These components of the CAPM, in part, compensate the investor for the level of risk assumed by investing in a particular security. Because the risk of the security, as measured by the CAPM, is based on its relationship to a diversified portfolio, CAPM assumes that the unsystematic risks (i.e., company-specific risks), are diversified away. Therefore, in the CAPM, the investor is only compensated for the systematic risk.

This CAPM assumption is probably reasonable with respect to the valuation of a publicly traded security within a well diversified portfolio of publicly traded securities.

Modified Capital Asset Pricing Model

The CAPM assumes that the only component of risk that investors care about is the risk of the market (i.e., systematic). One method of adjusting the CAPM to make it applicable to the valuation of private company securities is to add an alpha factor.

The CAPM formula is typically modified to reflect the additional risk associated with:

1. the size of the subject company and
2. company-specific risk factors.

These modifications result in the modified capital asset pricing model ("MCAPM"). The MCAPM incorporates these risk premiums in the quantification of a required rate of return.

The MCAPM formula is typically expressed as follows:

$$E(Ri) = Rf + \beta \times ERP + RPs \pm RPc$$

where:

$E(Ri)$ = Expected return for an individual security (i)
Rf = Rate of return available on a risk-free security
β = Beta
ERP = Market-derived equity risk premium
RPs = Risk premium for small size
RPc = Risk premium attributable to other company-specific risk factors[3]

The MCPAM is applicable to the valuation of private companies and private company securities.

Build-Up Model

A third model often applied to estimate a cost of equity capital in private company valuations is the BUM. In the BUM, a discount rate is estimated by adding the analyst's quantified assessments of the systematic and unsystematic risks associated with a particular business or interest. The BUM considers five basic elements in the estimation of the cost of equity capital.

The BUM formula is typically expressed as follows:

$$E(Ri) = Rf + ERP + RPs \pm RPi \pm RPc$$

where:

$E(Ri)$ = Expected (market required) rate of return on security (i)
Rf = Rate of return available on a risk-free security
ERP = Market-derived equity risk premium
RPs = Risk premium related to size
RPi = Risk premium attributable to the specific industry
RPc = Risk premium attributable to the specific company[4]

The fourth component of the BUM is an industry risk premium, which is somewhat analogous to the beta coefficient component used in the CAPM or the MCAPM. This risk premium is added to account for industry-specific risks that are diversified away in the market-derived equity risk premium.

In other words, the subject company's industry may have a greater, or lesser, risk than the risk of the market and the industry risk premium is an adjustment to reflect the difference in risk.

The company-specific risk premium is meant to encompass risk not attributable to the market, industry, or size of a company. This premium is often referred to as the "unsystematic risk premium" or the "idiosyncratic risk premium."

Factors that are often encompassed by this risk premium include the private company's product/service diversification, geographical diversification, age of company management, private company's history of success, as well as a myriad of other factors.

Issues in the Cost of Equity Capital

The cost of equity capital may be a controversial issue in valuation-related disputes. This is because professional judgment may be required to select the inputs to the cost of equity capital calculation. The following sections address several issues that affect both the MCAPM and the BUM.

Size Risk Premium

The selection of the appropriate size equity risk premium alpha component is sometimes an issue in valuation-related disputes. Analysts may have differing interpretations regarding the selection of the appropriate size-related equity risk premium.

In general, most analysts apply the size equity premium alpha factor component in the cost of equity calculation. If other market factors have incorporated the risk regarding size differences, then the size premium may not be appropriate. For example, one scenario in which it may be inappropriate to include a size risk premium is if the subject entity is of similar size to its guideline publicly traded companies.

The market capitalizations of companies that comprise the benchmark public company deciles for size risk premiums do not overlap in numerical order. That is, each decile does not start exactly at the end of previous decile.

For example, in the *2017 Valuation Handbook—Guide to Cost of Capital* ("*Valuation Handbook*"), the 7th decile starts at a market capitalization of $1,033.341 million, while the 8th decile ranges from a market capitalization of $569.279 million to $1,030.426 million, and the 9th decile ends at a market capitalization of $567.843 million.

Since the deciles are not continuous, one analyst may argue that a subject company with a market capitalization of $1,032.0 million should have a size risk premium associated with the 7th decile, while another analyst may argue that the size risk premium should be from the 8th decile.

Alternatively, some analysts rely on the decile groups, that is the "Mid-Cap 3-5," "Low-Cap 6-8," and "Micro-Cap 9-10."

The application of the 10th decile size risk premium may be controversial. The companies that comprise the company-specific risk premium ("CRSP") 10th decile size category have equity market capitalizations that range from $2.5 million to $262.9 million.[5]

As of December 31, 2016, the risk premium related to the companies comprising the 10th decile was 5.59 percent. The companies that comprise the CRSP 10th decile size category are broken down into subcategories 10a and 10b, as presented in the *Valuation Handbook*. The companies that comprise the 10a subdecile include companies with market capitalizations between $127.3 million and $262.9 million, and the reported size premium is 4.09 percent.[6]

Within the 10a subdecile and 10b subdecile categories of the 10th decile, the *Valuation Handbook* presents more subcategories. The 10a subdecile is broken into 10w and 10x subdeciles, while the subdecile 10b is disaggregated into 10y and 10z.

According to the *Valuation Handbook*, "The CRSP Deciles Size Premia include all companies with no exclusion of speculative (e.g., start-up) or distressed companies whose market capitalization may be small because they are speculative or distressed."[7]

"If the subject company is under financial distress or entering bankruptcy, then the application of the 10th decile, or its subcategories, may be the most appropriate measure of size premium risk."

If the subject private company is not financially distressed or entering bankruptcy but has the market capitalization fitting the 10th decile, the 10th decile size risk premium may not be appropriate. In situations in which that subject company fits into the 10th decile but is not operating under financial distress or entering bankruptcy, the application of the Micro-Cap 9-10 decile size risk premium may be a more supportable option.

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Company-Specific Risk Premium

A typical range for the application of the CSRP is 1 percent to 10 percent. However, it is not uncommon for an analyst to apply a CSRP of 0 percent or even a negative percentage. In a 0 percent or negative percent CSRP selection scenario, the implication is that the subject company provides less of an investment risk than an investment in a general equity stock market participant.

It is uncommon for an analyst to apply a CSRP of greater than 5 percent. However, in certain matters, if the subject entity is in financial distress, an early stage start-up company, subject to private equity or venture capital funding, or other extraneous circumstances, then it may be appropriate to select a CSRP greater than 5 percent.

There is no one generally accepted model, formula, equation, or method available for the analyst to quantitatively measure the CSRP. Typically, the CSRP is estimated based on the analyst's informed judgment, with consideration to various recognized factors. Analysts have suggested

certain sets of factors that should be considered regarding the CSRP selection process.

The textbook *Understanding Business Valuation* presents factors that analysts often consider in selecting the CSRP.[8]

Analysts may consider each of these quantitative and qualitative factors in selecting the appropriate CSRP. Certain categories of CSRP financial factors to consider include the following list:

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

Also presented in *Understanding Business Valuation*, certain categories of nonfinancial CSRP factors include the following list:[9]

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

Market-Derived Equity Risk Premium

Many analysts agree that risk premiums seem to vary over time. A variety of different methods exist for estimating an ERP. Three of the ERP measurements include the historical, the supply-side, and the Duff & Phelps recommended ERP.

Duff &Phelps estimates the historical ERP by calculating the difference between actual historical excess returns and the excess return predicted by beta. One issue with this method is that historical returns may not be indicative of future returns. Another issue is that historical average returns tend to be fairly unstable and can vary widely depending on the time period selected by the analyst.[10]

To address this issue with the historical ERP, analysts have developed other methods for estimating an ERP. One such method results in the supply-side ERP.

The supply-side ERP shares the same historical data information that is used to calculate the historical equity risk premium. However, the supply-side ERP incorporates an adjustment based on the observation of stock price-to-earnings ratio inflation that is not expected to continue in the future. The supply-side method typically provides a lower ERP than the historical method.

In *Global GT LP v. Golden Telecom, Inc.*,[11] the Delaware Court of Chancery concluded that the application of the supply-side ERP was more appropriate than the application of the historical ERP.

In its opinion, the court acknowledged that the historical equity risk premium was more typically applied. However, the court concluded that the academic community accepted the supply-side equity risk premium as the more appropriate ERP section.

Another ERP model in the Duff & Phelps reference literature includes the "recommended" ERP. This ERP is published annually by Duff & Phelps.

The Duff & Phelps "recommended" ERP is based on a variety of economic information and other ERP estimation methodologies. The Duff & Phelps recommended ERP is intended to account for economic changes that affect investor expectations of equity risk and returns on a normalized basis.

The Duff & Phelps "recommended" ERP was first published in 2008 as a response to the economic environment at that time. The Duff & Phelps recommended ERP and normalized risk-free rate are based on the belief that the historical ERP and supply-side ERP overstate equity investors return expectations.[12]

The application of the Duff & Phelps "recommended" ERP and the Duff & Phelps normalized risk-free rate generally result in a cost of equity calculation that is lower than the cost of equity calculation using the historical and supply-side ERPs with a market derived risk-free rate indication.

Build-Up Model Issues

Selecting an Industry Risk Premium

Since industry risk premiums are based on Standard Industrial Classification ("SIC") codes, it is important that the analyst has support for the selection of SIC codes for the subject company. Analysts may

disagree with the selection of the appropriate SIC code. In certain cases, the analyst may select a very general SIC code because a more specific SIC code could not be identified.

Multiple Industry Risk Premiums or Weighting Industry Risk Premiums

When a private company has operations across several industries, relying on more than one SIC code for the industry risk premium may be appropriate.

For example, some companies (e.g., conglomerates) have complex business operations. Berkshire Hathaway is an example of a company with a complex business structure.

Berkshire Hathaway owns business operations in several industries—such as, the paint and battery industries through their Benjamin Moore and Duracell brands, respectively.

Possible SIC codes for the paint and battery industries are as follows:

- SIC 2851: paints, varnishes, lacquers, enamels, and allied products
- SIC 3691: storage batteries

The long-term supply side industry risk premiums for the closest SIC codes according to *Valuation Handbook* are 0.39 percent for SIC code 28: chemicals and allied products and 2.8 percent for SIC code 369: miscellaneous electrical machinery.

Prior to deciding how to use this industry data, the analyst should also consider the number and type of companies that are used by Duff & Phelps to calculate the industry risk premium indications. In some cases, Duff & Phelps may rely on 5 companies, and in other cases 30 or 40 companies may be used. In certain cases, the data may be unduly influenced by one or two companies—this is more of an issue if there are only a handful of companies that comprise the industry risk premium calculation.

Since there can be substantial differences in the industry risk premiums, analysts may consider using a weighted average of the industry risk premiums. Generally, the analyst will use revenue or earnings before interest, taxes, depreciation, and amortization ("EBITDA") as the metric to determine the applicable weight for the industry risk premiums.

It is not uncommon for analysts to disagree on how the weighting system should be determined—or even if a weighted average should be applied as opposed to a simple average.

Modified Capital Asset Pricing Model Issues

Beta is an integral component of the application of the MCAPM. In order to properly address some of the more technical points with the MCAPM, it may be helpful to understand the process of calculating and selecting a beta. The following list provides an overview of the process:

1. Select the guideline publicly traded companies ("GPTCs") that are relatively similar to the subject company
2. Calculate the GPTC beta estimates based on different frequencies of observation and observation periods
3. Unlever the GPTC beta estimates based on their respective capital structures
4. Select an appropriate capital structure for the subject company
5. Relever the GPTC beta estimates based on the selected capital structure for the subject company

6. Review and analyze the relevered betas based on their frequency of observation and observation periods
7. Select an appropriate beta for the subject company

Some of the issues in this process include (1) the selection of the GPTCs, (2) the frequency of observation, (3) the observation periods, (4) relevering based on the capital structure, and (5) the appropriate beta estimate.

Selecting Guideline Publicly Traded Companies for Beta

One analyst may consider that the companies the opposing analyst selected to calculate beta are not truly comparable. In the *Estate of Victor P. Clarke*,[13] the Tax Court listed the following factors to determine the comparability of GPTCs to the subject company:

1. Products
2. Markets
3. Management
4. Earnings
5. Dividend-paying capacity
6. Book value
7. Position of company in industry

While this is a substantial list of factors, it is not an exhaustive list.

The American Society of Appraisers recommends consideration of the following qualitative and quantitative factors for selecting guideline companies:

1. Industry
2. Multiple lines of business
3. Nature of market
4. Geographic operations
5. Financial performance (including size)
6. Reputation and maturity of the company
7. Management depth and experience
8. Labor force availability, experience, turnover, and so forth

The analyst may select a conglomerate type business in the GPTC group because of a product/service offering that is comparable to the subject business. Or, the analyst may exclude the conglomerate-type business because its size or diversified operations do not compare to the subject business. The inclusion or exclusion of a conglomerate in determining beta may result in large differences in the concluded cost of equity capital.

Ultimately, the analyst is responsible for supporting the selection of GPTCs used to estimate the appropriate beta.

Frequency of Observation for Beta

Since betas are calculated based on observations, the appropriate frequency of the observation can be subject to disagreement. Three typically applied frequencies are daily, weekly, and monthly.

The benefit of employing higher frequency is that, due to the larger number of observations, outliers may have a lesser effect. Because of this, some analysts prefer to use daily or weekly frequencies.

The application of lesser frequency observations—monthly estimates or weekly estimates—may indicate that the GPTCS have a relatively low active trading volume. Higher frequency estimates with low active trading volume may be subject to illiquidity bias issues.[14]

Observation Period for Beta

One disagreement among analysts involves the observation look back period from which the beta is estimated. Two typical observation periods are two-year and five-year look back periods. One consideration for using a two-year period may be that some of the GPTCs underwent their initial public offering within the last five years and significant volatility may be incorporated in a five-year observation period. The impact of an outlying company return observation is lessened by the incorporation of a longer time period.

Capital Structure for Relevering Beta

Analysts typically unlever GPTC betas in order to remove the effects of debt in the company's capital structure. Unlevering is achieved using the respective capital structures. Relevering these betas is based on the analyst's selection of an appropriate capital structure for the subject company.

The analyst should be able to support the selection of the capital structure used the unlevering and relevering of beta estimates. The analyst typically estimates the subject company capital structure based on one of the following:

1. The optimal capital structure
2. The industry-based capital structure
3. The actual capital structure

An issue may arise in the analyst's estimation of the subject company's actual capital structure. Some analysts use an iterative method (based on market value of invested capital) to determine the subject company's actual capital structure. Other analysts use the subject company's accounting-book-value-based capital structure.

If the subject is a controlling ownership interest, then the holder of the subject interest is able to affect the capital structure of the company. In this case, the analyst typically selects an optimal capital structure base. To perform that procedure, the analyst may calculate and rely on GPTC capital structures, or other industry capital structure data. Additionally, the analyst may apply an optimal capital structure based on a target provided by company management.

It is up to the analyst to determine which capital structure is the most appropriate. The capital structure estimate used for calculating the WACC should be the same capital structure estimate used to relever the selected beta estimate.

Multiple Betas or Weighting Betas

If the subject interest has highly diversified business operations and/or product/service offerings, the analyst may select guideline companies from several different industries. This procedure may raise an issue between analysts, especially if some of the included guideline companies:

1. represent only a small portion of the subject company operations and
2. have different capital structures and betas from the other guideline companies.

Alternatively, the analyst may calculate several different industry beta estimates based on various guideline companies and apply a weighting system to determine an appropriate beta for the subject company. This procedure for calculating beta may raise an issue. This is because the opposing analyst may disagree with:

1. the calculation of multiple betas and
2. the weighting system applied.

Additionally, one analyst may apply a weighting system based on revenue, while the other may apply one based on EBITDA. The analyst should explain and support the application of any weighting system.

Calculating multiple betas to reflect the different operations of the subject interest may be appropriate. However, this procedure may raise an issue if the subject interest is well diversified. The opposing analyst may argue that there are GPTCs that incorporate this diversification.

Summary and Conclusion

While the BUM and the MCAPM are generally accepted cost of equity capital models, there may be disagreements over the inputs to each model. This is because a minor difference in the discount rate may lead to substantial differences in the overall business value conclusion.

It is important for the analyst to understand, support, and explain the rationale for selecting and applying each factor applied in the cost of equity capital analysis.

Notes:

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3. Ibid., 197.
4. Ibid., 180.
5. Duff & Phelps, *2017 Valuation Handbook: Guide to Cost of Capital*, Appendix 3.
6. Ibid.
7. Ibid., 4–12.
8. Gary R. Trugman, *Understanding Business Valuation*, 2nd ed. (New York: American Institute of Certified Public Accountants, 2002), 331–334.
9. Ibid.
10. https://faculty.mccombs.utexas.edu/keith.brown/AFPMaterial/TopicC10.1.pdf
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14. "Estimating Risk Parameters," Aswath Damodaran, Stern School of Business - http://people.stern.nyu.edu/adamodar/pdfiles/papers/beta.pdf.

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