



NOTE: This section is from the *2017 Valuation Handbook – U.S. Guide to Cost of Capital* (data through December 31, 2016). All of the data used in this section in the examples is from the same book.

These examples are intended to be *generic*. In other words, the *methodologies and frameworks* described in this section can be applied when using valuation data from different data-years, but the valuation *data* itself used in this section is applicable *only* to the 2017 data-year.

Risk Premium Report Study – Examples

In this chapter, we first discuss concepts that are specific to each of the four Risk Premium Report studies (Size Study, Risk Study, High-Financial-Risk Study, Comparative Risk Study), and then provide detailed examples for using the data in each to estimate the cost of equity capital.

Size Study

The size of a company is one of the most important risk elements to consider when developing cost of equity estimates for use in valuing a firm. Traditionally, researchers have used market value of equity (i.e., “market capitalization” or simply “market cap”) as a measure of size in conducting historical rate of return research. For example, the Center for Research in Security Prices (CRSP) “deciles” are developed by sorting U.S. companies by market capitalization. Another example is the Fama-French “Small minus Big” (SMB) series, which is the difference in return of “small” stocks minus “big” (i.e., large) stocks, as defined by market capitalization.^{10.1, 10.2}

Reasons for Using Additional Measures of Size

There are several reasons for using other measures of size in *addition* to the traditional measure of size, market value of equity.

First, financial literature indicates a bias may be introduced when ranking companies by market value of equity because a company's market value of equity may be affected by characteristics of the company other than size.^{10.3} In other words, some companies might be small because they are risky (high discount rate), rather than risky because they are small (low market capitalization). One simple example could be a company with a large asset base, but a small market capitalization as a result of high leverage or depressed earnings. Another example could be a company with large sales or operating income, but a small market capitalization due to being highly leveraged.

Second, market capitalization may be an imperfect measure of the risk of a company's operations.

Third, using alternative measures of size may have the practical benefit of removing the need to first make a “guesstimate” of size in order to know which portfolio's premium to use (this issue is commonly referred to as the “circularity” issue). When you are valuing a closely held company, you are trying to determine market value of equity. If you need to make a guesstimate of the subject

^{10.1} To learn more about the Center for Research in Security Prices (CRSP) at the University of Chicago Booth School of Business, visit www.CRSP.com.

^{10.2} Eugene Fama, 2013 Nobel laureate in economic sciences, is the Robert R. McCormick Distinguished Service Professor of Finance at the University of Chicago, and Ken French is the Roth Family Distinguished Professor of Finance at the Tuck School of Business at Dartmouth College. Fama and French are prolific researchers and authors who have contributed greatly to the field of modern finance. Fama and French's paper “The Cross-Section of Expected Stock Returns” was the winner of the 1992 Smith Breeden Prize for the best paper in the *Journal of Finance*. Fama is also chairman of the Center for Research in Security Prices (CRSP) at the University of Chicago Booth School of Business.

^{10.3} “A Critique of Size Related Anomalies”, Jonathan Berk, *Review of Financial Studies*, vol. 8, no. 2 (1995).

company's market value of equity first in order to know which size premium to use, the "circularity" problem is introduced. While market capitalization, at least for a closely held firm, is *not* generally available, other size measures, such as total assets or net income, *are* generally available.^{10.4}

Finally, when doing analysis of any kind it is generally prudent to approach things from multiple directions if at all possible. This is good practice for several reasons, with the most important being that it has the potential of strengthening the conclusions of the analysis.

The Difference Between the Size Study's A Exhibits and the B Exhibits

The results of the Size Study are presented in Exhibits A-1 through A-8 and Exhibits B-1 through B-8. The main difference between the A and B exhibits is how they are used. The A exhibits are used if you are using a "build-up" method to develop cost of equity capital estimates, and the B exhibits are used if you are using the capital asset pricing model (CAPM) to develop cost of equity capital estimates. This difference in usage is a function of the type of "risk premia" presented in each of the exhibits:

The A exhibits provide "risk premia over the risk-free rate" (RP_{m+s}) in terms of the combined effect of *market* risk and size risk for 25 portfolios ranked by eight alternative measures of size. These premia can be added to a risk-free rate (R_f) to estimate cost of equity capital in a build-up model.

The B exhibits provide "risk premia over CAPM" (i.e., size premia) (RP_s) in terms of size risk for 25 portfolios ranked by eight alternative measures of size. These premia are commonly known as beta-adjusted size premia, or simply size premia. These premia can be added as a size adjustment to a basic CAPM to estimate cost of equity capital.^{10.5}

The Difference Between "Risk Premia Over the Risk-free Rate" and "Risk Premia Over CAPM"

Risk Premium Over Risk-Free Rate (RP_{m+s})

"Risk premia over the risk-free rate" represent the difference between the historical (observed) total return of equities over the risk-free rate.^{10.6} A long-run average historical risk premium is often used as an indicator of the expected risk premium of a typical equity investor. Total returns are based on dividend income plus capital appreciation and represent returns after corporate taxes (but before owner-level taxes). To estimate the historical risk premia in the *2017 Valuation Handbook – U.S. Guide to Cost of Capital*, the average total return for each of the 25 size-ranked portfolios is calculated over the sample period, and then the average income return of long-term U.S. government bonds (using SBBI data) over the same period is subtracted.

^{10.4} For further discussion of the history of the size premium and criticisms of the size premium, see Chapters 14 and 15 in *Cost of Capital: Applications and Examples* 5th ed. by Shannon Pratt and Roger Grabowski, Wiley (April, 2014).

^{10.5} The basic CAPM formula is *Cost of Equity Capital = Risk-Free Rate + (Beta x ERP)*. A "modified CAPM" usually refers to the common modification to the CAPM formula that is used to incorporate an adjustment for size: *Cost of Equity Capital = Risk-Free Rate + (Beta x ERP) + Size Premium*. Please note that the modified CAPM as presented is after addition of a size premium and prior to the addition of any "company-specific" risk premia that the individual valuation analyst may deem appropriate.

^{10.6} Risk premia over the risk-free rate and size premia are presented in the Risk Premium Report Exhibits. The CRSP Deciles Size Premia exhibits present size premia, but do not include risk premia over the risk-free rate.