Modified Formula for Adjusting Cost of Capital for Current Market Conditions

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How can one adjust the cost of capital to reflect current market conditions? Does inclusion of the βSIZE and SP$_H$/ERP$_H$ result in double counting? This article answers these questions.

I made a presentation called "Cost of Capital for Prevailing Market Conditions" at the September 14-16, 2015, NACVA Business Valuation Conference in Pittsburg, PA. This presentation demonstrated my concept for using a stock index such as the S&P 500 and the corresponding earnings per share of index to calculate a market capitalization rate as of a particular date, which can be used with cost of capital data such as in the Duff & Phelps *2014 Valuation Handbook* to calculate date-specific cost of capital that reflects current market conditions.[1] Slide 27 of my presentation presented a formula to describe the mechanics of calculating a cost of equity capital based on market conditions. The formula was stated as follows:

$$K_{cm} = K_H - ERP_H + ERP_{CAPM} + \beta_{SIZE} \times (CR_{cm} - CR_H) + SP_H + (SP_H + ERP_H) \times (CR_{cm} - CR_H)$$

Where:

K_{cm}	= cost of equity capital for the current market (e.g., 27.98%)
K_H	= historical cost of equity capital for the market (e.g., 12.05%)
ERP_H	= historical equity risk premium of the market (e.g., 6.96%)
ERP_{CAPM}	= historical equity risk premium predicted by CAPM (e.g., 9.38%)
β_{SIZE}	= historical CAPM size beta (e.g., 1.35)
CR_{cm}	= capitalization rate of the current market (e.g., 5.80%)
CR_H	= historical capitalization rate of the market (e.g., 5.35%)
SP_H	= size premium in excess of ERP predicted by CAPM (e.g., 12.12%)

With the exception of CR_{cm} and CR_H, all of the values assumed for the defined terms come from Exhibit 7.3 of the *2014 Valuation Handbook*.[2]

Slide 21 of my presentation showed that a 0.45% change in the market capitalization rate relative to a long-term average market capitalization rate equates to a 1.39% change in the equity risk premium

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[1] My presentation was based on an article that I authored called "A Method to Adjust the Cost of Equity Capital for Prevailing Market Conditions" that was published by the AICPA in May 2015 in *FVS Consulting Digest*.

[2] Note that β_{SIZE} is assumed to be a factor of 1.35. Slide 27 of my presentation erroneously stated the assumption as 1.35%.

("ERP") of an Ibbotson decile 10z company using the values shown in Exhibit 7.3 of the *2014 Valuation Handbook*. Table 5 below is from slide 21 of my presentation. It uses the information from Exhibit 7.3 to calculate the 1.39% cost of capital adjustment:

Table 5
Simplified Calculation of Market-Based ERP Using the CRSP Data
in the Duff & Phelps Valuation Handbook (Exhibit 7.3)

	Calendar Year 2013
Historical CAPM equity risk premium – decile 10z (Table 1)	9.38%
Historical equity size premium in excess of CAPM – decile 10z (Table 1)	12.12%
Total historical equity risk premium – decile 10z	21.50%
Historical CAPM equity risk premium for the S&P 500 (Table 1)	÷ 6.96%
Ratio of historical decile 10z-to-market equity risk premium	3.09
Current minus historical market capitalization rate (5.80% - 5.35%) (slide 7)	0.45%
Incremental increase in small company ERP – decile 10z (β_{cm})	1.39%

An ERP change of 1.39% has the effect of increasing the long-term average cost of equity capital of a decile 10z company from 26.59% to 27.98%, as shown in slide 23 of my presentation. Applying the values shown in the above term definitions to the formula as stated results in the following math:

$$12.05\% - 6.96\% + 9.38\% + 1.35 \times (5.80\% - 5.35\%) + 12.12\% + (12.12\% / 6.96\%) \times (5.80\% - 5.35\%) =$$
$$14.47\% + 1.35 \times (0.45\%) + 12.12\% + (1.74) \times (0.45\%) =$$
$$14.47\% + 0.61\% + 12.12\% + 0.78\% = 27.98\%$$

Note that the components 0.61% + 0.78% above equal 1.39%, which is the expected change in ERP due to current market conditions.

During my presentation, Ashok Abbot, Ph.D., raised an objection to the formula as stated. If I recall his objection correctly, he asserted that the variable β_{SIZE} is the same beta as results from (SP_H / ERP_H), thereby double counting the beta. But clearly that is not the case since the decile 10z value for β_{SIZE} reported by Duff & Phelps is 1.35 while the calculated value of (SP_H / ERP_H) is 1.74. The distinction is that β_{SIZE} is the historical CAPM size beta, while (SP_H / ERP_H) represents the historical size premium in

excess of ERP as *predicted by CAPM*, divided by the historical equity risk premium of the market. The

two betas are measuring different things, and there is no double counting.

   After my presentation I concluded that I could restate the above formula in a simpler form that

eliminates two of the defined terms that led to Dr. Abbot's confusion. This restated formula is:

$$K_{CM} = K_H - ERP_H + ERP_{CAPM} + SP_H + ((ERP_{CAPM} + SP_H) / ERP_H) \times (CR_{CM} - CR_H)$$

Where:

K_{cm}	= cost of equity capital for the current market (e.g., 27.98%)
K_H	= historical cost of equity capital for the market (e.g., 12.05%)
ERP_H	= historical equity risk premium of the market (e.g., 6.96%)
ERP_{CAPM}	= historical equity risk premium predicted by CAPM (e.g., 9.38%)
CR_{cm}	= capitalization rate of the current market (e.g., 5.80%)
CR_H	= historical capitalization rate of the market (e.g., 5.35%)
SP_H	= size premium in excess of ERP predicted by CAPM (e.g., 12.12%)

Applying the assumptions stated in the term definitions to the formula results in this math:

12.05% - 6.96% + 9.38% + 12.12% + (((9.38% + 12.12%) / 6.96%) x 0.45%) =
26.59% + ((21.50% / 6.96%) x 0.45%) =
26.59% + (3.09 x 0.45%) =
26.59% + 1.39% = 27.98%

   Both formulas yield the same mathematical result. And both formulas allow practitioners to craft

a cost of capital that is specific to the market conditions extant on the valuation date. One advantage of

the restated formula is that it eliminates the confusion that led to Dr. Abbott's criticism.   Another

advantage is that the restated formula can be used with both the CRSP data and the Risk Premium

Report data included in the *2014 Valuation Handbook.*

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