Background on the Calculation of the Implied Cost of Capital

Website-Primer

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1. General remarks

Our approach for calculating the implied cost of capital (ICC) and the implied market risk premium builds primarily on Claus und Thomas (2001) and Gebhardt et al. (2001), which aims at extracting an implied discount rate within a dividend discount model using parameters observable at the market. This implied discount rate can be interpreted as the expected stock return of the representative investor. Deducing the risk-free yields a point-in-time estimation of the implied market risk premium. A more detailed description can be found in Berg et al. (2016).

More specifically, we start from a dividend discount model relating the expected dividends to the current market value of a company. Using n years of explicit dividend forecasts and a constant-growth assumption from year n+1 on, the market value of a firm i can then be written as:

$$MV_{i,0} = \sum_{j=1}^{n} \frac{D_{i,0}}{(1+k_i)^j} + \frac{D_{i,n+1}}{(k_i-g_i)(1+k_i)^2} \tag{1}$$

where k_i is the implied cost of capital of a firm i, $MV_{i,0}$ is the current market value of firm i, $D_{i,j}$ the j-year ahead dividend forecast and g_i the long-run growth rate.

2. Data

The expectations of the market are proxied by analysts' estimates about future earnings. Therefore, we use analyst estimates from Thomson Reuters' Institutional Brokers Estimate System (I/B/E/S) database. The implied market risk premia are calculated on a monthly basis. The broad coverage

of analyst estimates (besides price information) allows to calculate implied cost of capital and market risk premia for 35 countries as well for 12 industries.

3. Empirical estimation

The current market value of a firm ($MV_{i,0}$) refers to the product of the number of shares outstanding and the share price. The per-share dividend forecasts ($D_{i,j}$) for the first two years are taken from the mean estimates of all analysts providing dividend estimates for this particular firm. The dividend forecast for a firm is then determined by multiplying the per-share forecast by the number of shares outstanding.

We use dividend forecasts for the first two years (n=1, 2) and derive the dividend in year n=3 jointly from the earnings forecast and the long-run growth rate. For that purpose we assume that payout ratios and growth rates from year n+1 on must be consistent, i.e., dividends must grow in line with the long-run book value. Hence, it must hold:

$$\frac{E_{i,n+1} - D_{i,n+1}}{BV_{i,n}} = g_i \tag{2}$$

Our assumption boils down to saying that earnings and dividends cannot grow faster than book values over the long-run. This assumption is equivalent to saying that return on equity will continue to stay at the level it reached directly before the terminal value period started. Note that equation (2) is used to estimate the dividend for n=3 by the relationship $D_{i,3} = E_{i,3} - g_i BV_{i,2}$.

For the long-run growth rate (g_i) , we use the assumption $g_i = \max(r_f - 2\%, 0)$, where r_f is the 10-year Government bond yield of the respective country. We use the 10-year Government bond yield as this is longest maturity government bond yield that is consistently available for a large set of countries. Conceptually, government bond yields should be equal to the long-run nominal growth of the economy. In the spirit of Claus and Thomas (2001), we deduct 2% from the government bond yield to account for the fact that part of this growth is likely to come from new

firms, so that existing firms should grow at a rate somewhat lower than the growth rate of the economy.

4. Aggregation across countries/markets/industries

Equation (1) is applied on the market, country or industry level. Therefore, firms have to be aggregated beforehand, i.e. we aggregate the input parameters (market cap, dividends, earnings) of all firms. Hence, we treat one market as if there was only one representative public firm.

5. A simple example: The U.S. implied cost of capital estimate for November 2014

The following table provides an overview of aggregate statistics for the U.S. market as of November 2014:[1]

MV_0	BV_0	BV_2	D_1	D_2	E_3
$ 22,933bn	$ 8,347bn	$ 10,060bn	$ 440bn	$ 472bn	$ 1,554bn

The 10-year U.S. government bond yield was 2.18% as of end-of-November 2014, resulting in a growth rate assumption (g) of 0.18%. The Dividend for t=3 (D3) as well as the Terminal Value (TV) from t=4 onwards are estimated from E3. Specifically, D3 is estimated by $D3 = E3 - g*BV_2$ and TV is estimated by $TV = (E3 - g*BV_2) / (ICOC+g)$. The resulting implied cost of equity (ICOC) are 6.33% and the equity risk premium is 4.15% (=6.33%-2.18%).

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[1] These numbers are based on the major stock class and all companies for which sufficient analyst forecast data is available. The total market capitalization (USD 22.933 bn) is therefore somehow lower than the total market capitalization of all stocks traded in the U.S. market.

Literature

Berg, T., Heigermoser, R., Kaserer, C., Kittlaus, D., Willershausen, T.: Schätzung erwarteter Marktrisikoprämien mittels impliziter Kapitalkosten. Corporate Finance **8** (7-8), 2017, 158-165.

Claus, J., Thomas, J., 2001. Equity Premia as Low as Three Percent? Evidence from Analysts' Earnings Forecasts for Domestic and International Stock Markets. The Journal of Finance, 56(5), pp.1629–1666.

Gebhardt, W.R., Lee, C.M.C. & Swaminathan, B., 2001. Toward an Implied Cost of Capital. Journal of Accounting Research, 39(1), pp.135–176.