The Cost of Capital of a Firm

Gestão Financeira II

Undergraduate Courses

2011-2012

Outline

- Cost of Equity (r_E)

- Cost of Debt (r_D)

- Weighted Average Cost of Capital (r_{wacc})

The Equity Cost of Capital (r_E)

- The CAPM is a practical way to estimate the Cost of Equity:

$$r_E = r_f + \beta_E \left[E(R_M) - r_f \right]$$

Risk Premium for the shares of the firm

- Example:

  – Suppose you estimate that Google's stock has a volatility of 26% and a beta of 1.45.

  – The risk-free interest rate is 3% and you estimate the market's expected return to be 8%.

  – Google's cost of equity capital would be:

$$r_E^{Google} = 3\% + 1.45 \times \left(8\% - 3\% \right) = 10.25\%$$

The Equity Cost of Capital (r_E)

- For firms that are not listed in a stock exchange there is no direct way of estimating their stock beta.

- In those cases, it is common to use a comparables method, estimating an average or industry beta that is then adjusted for the reality of the privately held firm.

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The Equity Cost of Capital (r$_E$)
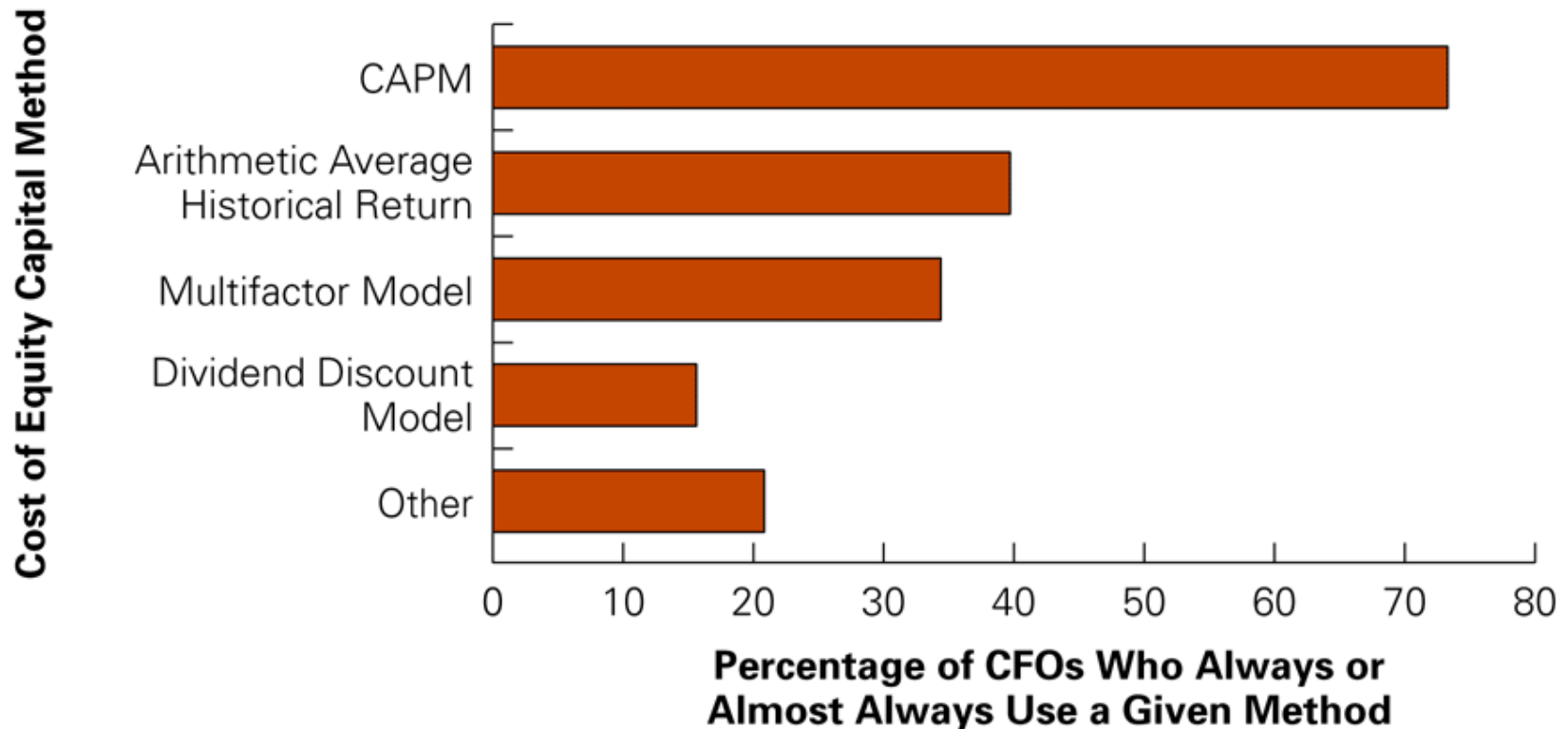
Source: J. R. Graham and C. R. Harvey, "The Theory and Practice of Corporate Finance: Evidence from the Field," Journal of Financial Economics 60 (2001): 187–243.

The Debt Cost of Capital (r_D)

- The most common way of estimating the Cost of Debt is using Debt Yields:
  - Yield to maturity is the IRR an investor will earn from holding the bond to maturity and receiving its promised payments.

  - *If there is significant risk of default, yield to maturity will overstate investors' expected return.*
    - In that case we must adjust for the *truly expected return* for the firm's creditors, taking into account the probability of default and the amount of expected loss in case of default.

The Debt Cost of Capital (r_D)

- Consider a one-year bond with YTM of *y*. For each $1 invested in the bond today, the issuer promises to pay $(1+*y*) in one year.

- Suppose the bond will default with probability *p*, in which case bond holders receive only $(1+*y-L*), where *L* is the expected loss per $1 of debt in the event of default.

- So the expected return of the bond is:

$r_D = (1-p)y + p(y-L) = y - pL =$

$= Yield\ to\ Maturity - Prob(default) \times Expected\ Loss\ Rate$

The Debt Cost of Capital (r$_D$)

- Annual Default Rates by Debt Rating (1983–2008):

Rating:	AAA	AA	A	BBB	BB	B	CCC	CC-C
Default Rate:								
Average	0.0%	0.0%	0.2%	0.4%	2.1%	5.2%	9.9%	12.9%
In Recessions	0.0%	1.0%	3.0%	3.0%	8.0%	16.0%	43.0%	79.0%

Source: "Corporate Defaults and Recovery Rates, 1920–2008," *Moody's Global Credit Policy*, February 2009.

- The average loss rate for unsecured debt is 60%.

- Example: The expected return to B-rated bondholders during average times is 0.052X0.60=3.1% below the bond's quoted yield.

The Debt Cost of Capital (r$_D$)

- Another way of estimating the Cost of Debt would be using the CAPM and Debt Betas.

  - Debt betas are difficult to estimate because corporate bonds are traded infrequently.

  - One approximation is to use estimates of betas of bond indices by rating category.

By Rating	A and above	BBB	BB	B	CCC
Avg. Beta	< 0.05	0.10	0.17	0.26	0.31
By Maturity	(BBB and above)	1–5 Year	5–10 Year	10–15 Year	> 15 Year
Avg. Beta		0.01	0.06	0.07	0.14

Source: S. Schaefer and I. Strebulaev, "Risk in Capital Structure Arbitrage," Stanford GSB working paper, 2009.

The Debt Cost of Capital (r_D)

- Example:
  - In mid-2009, homebuilder KB Home had outstanding 6-year bonds with a YTM of 8.5% and a BB rating.
  - Consider that the corresponding risk-free rate was 3%, and the market risk premium is 5%.
  - KB Home's Cost of Debt was:
    - Using the YTM, the probability of default of BB rating bonds, and the expected loss in default of 60%:
    $$r_D^{KBHome} = 8.5\% - 8\% \times 0.6 = 3.7\%$$
    - Using the Debt Beta of a BB rating bond, and CAPM:
    $$r_D^{KBHome} = 3\% + 0.17 \times 5\% = 3.85\%$$

The Cost of Capital of a Firm

- It is common to compute the weighted average of the costs of equity and debt. This rate is known as the WACC (weighted average cost of capital).

- (In the absence of corporate taxes) the pre-tax WACC is computed as: $$r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D$$

- In the presence of corporate taxes, due to the more favorable tax treatment given to debt financing, the WACC is computed as: $$r_{wacc} = \frac{E}{E+D} r_E + \frac{D}{E+D} r_D (1-T_C)$$

  – Note: The value of Debt considered here can be understood as "Net Debt" – by this we mean debt net of excess cash that the firm might hold. The denominator is the Enterprise Value.