

Beta Factor - Levered and Unlevered

The degree of synchronicity between the return of a share and that of the overall market is defined by a stock's beta. This factor is significantly influenced by a firm's capital structure, with higher leverage making a firm's performance more volatile. – Therefore, one has to distinguish between levered and unlevered betas.

Assuming debt – up to a certain level, at least - may be beneficial and optimize a firm's average cost of capital, as Cost of Equity (CoE) is more expensive than Cost of Debt (CoD). However, with an ever-increasing debt burden both, CoE and CoD will also increase, and along with them a firm's average cost of capital as well. - In regards to CoD, this is easy to understand, as creditors fear their debtor's enhanced default risk. – However, also CoE increases along with a higher debt burden: Whilst the CoE components of the risk-free rate and the market risk premium are given by the market (i.e. they are fixed input parameters), the variable which actually does change with a firm's increasing leverage is the beta factor.

To start with, beta factors disclosed in financial publications usually refer to levered betas: Therefore, betas published for certain stocks are almost always based on a firm's current capital structure. Hence, they are also referred to as equity betas. And, as most companies do have (some) debt on their respective balance sheets, the derived beta is the levered or equity beta.

The concept of the unlevered beta is a theoretical one, based on the assumption that the underlying company had no debt. It is also referred to as asset beta. (Naturally, for a company not having any debt on its balance sheet, the levered beta would indeed equal the unlevered beta).

Now, with a firm assuming (additional) debt, funds raised will typically be used for investments, such as an increase in operating capacity. Consequently, this

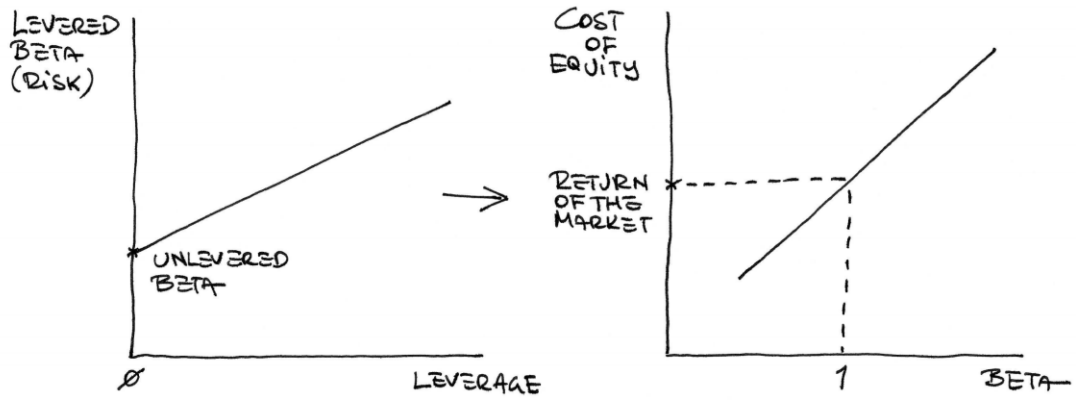
will increase the firm's total assets, and lengthen its balance sheet. – With a firm's expanded capacities, its revenues are expected to increase as well, but amid a higher debt burden, so do interest expenses. If the investment goes well, then interest expenses will increase less than revenues, ultimately improving a firm's bottom line, its net profit.

The really worrying consequences of an aggressive capital structure (i.e. excess leverage) come to light during an economic downturn: In this context, one has to keep in mind that in many cases the vast majority of a firm's interest-related expenses are fixed cost items. Therefore, with higher leverage, interest expenses will increase, and so will the block of fixed cost.

In both, an up- as well as downturn, revenues and variable costs will more or less develop in parallel, with margins hardly / not being impacted. - In regards to fixed costs, however, this is a different matter: They will remain (stubbornly) constant. Therefore, in a downturn a firm's bottom line will get squeezed, possibly to the extent of making (severe) losses. As interest expenses are usually fixed (and not variable) costs, leverage increases a firm's earnings volatility.

Identifying a firm's optimal capital structure is therefore a balancing act between adding lower-cost debt, whilst along with increasing leverage both, CoD as well as CoE are increasing: CoD due to an increasing default spread, CoE due to an increasing beta factor.

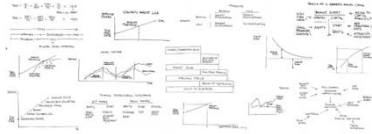
The calculation of unlevered betas is - among others - required as an interim step in assessing the impact of different leverage structures on a firm's CoE: Thereby, in a first step beta is de-levered and subsequently re-levered according to the new capital structure. – The concept may also be used, when comparing volatilities of different companies, thereby adjusting for comparable firms often having different capital structures: Else, a comparison among them would not be fair or appropriate.



$$\text{BETA}_{\text{UNLEVERED}} = \frac{\text{BETA}_{\text{LEVERED}}}{[1 + (1 - \text{TAX}) \times (D/E)]}$$

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