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Valuation updates | Beta: *An indispensable measure of security analysis*
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This thought leadership paper provides insights on the concept of beta in valuation.

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This thought leadership covers the following topics in relation to beta:

- *Introduction*
- *Estimation*
- *Interpretation*
- *Adjustments*
- *Limitations*

In the world of finance, the capital asset pricing model (CAPM) is the most widely used method for computation of cost of equity (Ke). The formula for Ke based on pure CAPM is:

$$Ke = R_F + (R_M - R_F) * \beta$$

Where;
R_F =Risk free rate
R_M= Market return
β = Beta

As can be observed from the above formula, the factor beta is used as a modifier to the equity risk premium (ERP). It is the sole risk factor of the pure CAPM, the form most often shown in textbooks.

A pre-requisite for understanding beta is to understand the difference between systematic and unsystematic risk.

Systematic risk
Inherent to the entire market or market segment
Diversification cannot eliminate these risks
Examples: inflation, war, fluctuating interest rates

Unsystematic risk
Specific to a company
Diversification can greatly reduce unsystematic risk
Examples: fire, slumping sales

What is beta?

Beta is a measure of the **systematic risk** of a stock, the tendency of a stock's price to correlate with changes in the market. The "market" is typically represented by a broad-based equity index that includes a wide range of industries and arguably behaves like the market as a whole.

Estimation of beta

The formula for computation of beta is:

> Beta = covariance (stock, market)/ variance of market

Where:

> Covariance = correlation (stock, market) * standard deviation (stock) * standard deviation (market))

A beta estimate for a public company comes by regressing excess returns of the public company's stock on the excess returns of a market portfolio over a look back period. (Top-down beta estimate)

A question often faced by valuation practitioners is that how is a beta estimate arrived at for a non-public company?

A proxy beta is estimated by identifying guideline public companies and estimating their betas. A proxy beta needs to be used when the subject business is a division, reporting unit, or a closely held business. (Bottom-up beta estimate)

Interpretation of beta

The market's beta is 1.0 by definition. A company with a beta equal to 1 has the same risk as the market. (Theoretically it moves up and down with the market in tandem), a company with a beta greater than 1 is riskier than the market and a company with a beta less than 1 is less risky than the market.

For example, if a stock's beta value is 1.3, it means, theoretically this stock is 30% more volatile than the market.

BETA

– MEASURES AN INVESTMENT'S VOLATILITY AS IT CORRELATES TO MARKET VOLATILITY

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What does beta tell you about the movement of security prices?

Value of beta	Interpretation
β = 0	Movement of security is uncorrelated with the movement of market
β = 1	Security moves proportionately with the market (same direction and equal magnitude)
β > 1	Security moves in the same direction with the market but with higher magnitude
0 < β < 1	Security moves in the same direction with the market but with lower magnitude

Impact of beta on share valuation

Beta Discount rate Share valuation

Adjustments to beta

Following are some of the adjustments that financial analysts make to the beta based on subject company/industry characteristics:

a. **Unlevering and relevering beta:** Betas published for public stocks reflect the capital structure of the companies and are known as levered betas. They incorporate two risk factors: business (or operating) risk and financial (or capital structure) risk. Removing the effect of financial leverage i.e. unlevering the betas is desirable to eliminate the impact of the varying capital structures of the comparable companies on the beta. The formula for unlevering beta is as follows:

$$\beta_U = \beta_L / [1 + (1-t)(W_d/W_e)]$$

Where:

βU: unlevered beta
βL: levered beta
t: tax rate for the company
Wd: proportion of debt in the capital structure
We: proportion of equity in the capital structure.

The unlevered beta is then relevered based on an appropriate capital structure applicable to the subject company

b. **Blume adjustment:** Based on the assumption that betas tend to move toward the market's beta (1.00) over time, a weighted average beta may be computed by weighing the historical betas by 2/3rd and the market beta by 1/3rd.

c. **Operating leverage:** The unlevered beta may also be adjusted for operating leverage as the operating leverage of the guideline public companies may differ from that of the subject company. The unlevered beta is adjusted for operating leverage by applying the following formula:

$$\beta_O = \beta_U / (1 + F_C/V_C)$$

Where:
β_O: Beta adjusted for operating leverage
F_C: Weight of fixed cost in operating expense structure
V_C: Weight of variable cost in operating expense structure

d. **Excess cash and investments:** The unlevered betas of the guideline public companies may be adjusted for excess cash and marketable securities held by the companies. Non-inclusion of the surplus assets (assets that can be sold or distributed without impairing company operations) leads to an incorrect estimate of the beta. The adjustment is based on the principle that the beta of the overall company is the market-value weighted average of the business or assets (including excess cash comprising the overall firm). The formula is as follows:

β_U= [Asset beta for operations*(operating assets/total assets)]+[asset beta for surplus assets*(surplus assets/total assets)]

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Insights on Beta *(cont…)*

Limitations

- Beta is an indicator of short term risk and fails to capture longer term fundamental risk, where big-picture risk factors are more indicative. High betas may mean price volatility over the near term, but they don't always rule out long-term opportunities;

- Computation of beta involves a great deal of estimation regarding the period, the periodicity of the return interval (i.e. daily, weekly, monthly, and annual), the appropriate market index, the use of a smoothing technique, and adjustments for small company stocks; and

- Beta on its own is somewhat deceptive. It is an historical statistic, and a stock, bond or fund is not always going to behave like its beta predicts. It is useful to pair it with R2 i.e. the coefficient of determination, which indicates the proportion of a security's total variance related to the market, and which illustrates the reliability of the beta. This is computed by comparing the market's variance with the security's variance. A higher R2 represents a greater confidence in the beta's information. A low R2 may mean that the instrument's return is more affected by events other than market-related risk.

Can betas be negative?

The concept of negative beta goes against the intuition that if a beta of 1 represents average risk and a beta of zero represents no risk, then how can an investment have negative risk? However the answer to this question is in the affirmative. Beta should be viewed as the risk added by an investment to a well-diversified portfolio. Accordingly, any investment when added to a portfolio which makes the overall risk of the portfolio go down, is said to have a negative beta. A standard example that is offered for a negative investment is gold which acts as a hedge against higher inflation.

By the definition of beta, the prices of security with a negative beta move in the opposite direction of the market.

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