HARIBHAKTI GROUP

Ensuring flawless process, always.

Bottom-up Beta

(A focused approach to risk reward relationship)

At Haribhakti, we examine,
design and add value to every process
- right down to the very last dot.

Bottom-up Beta

In the last few years there has been an increase in M&A deals globally and more so in India. In fact India Inc has done more mergers and acquisitions in the first half of 2006 than in the whole of 2005. Indian companies struck deals worth $25.6 billion in the first six months of 2006, up from $8 billion in the first half of 2005, and $23.6 billion for the whole year. The key drivers for the growth in Indian M&A are entry into new markets, establishment of leadership positions by existing players, extension of domain knowledge by acquisition of know-how, and the focus on infrastructure.

The most appealing part of these transactions is that there has been a sharp rise in outbound deals. The Indian promoters are now more confident of handling overseas assets, and in the years to come, outbound deals will find only one way to go: up and up. With this increased focus on inorganic growth, the valuation of the deal gains preponderance significance. It is this figure which determines the success or failure of the deal. The most recent example of a high profile deal going sour is that of the failed merger of Jet Airways with Air Sahara. Around Rs 2,000 crore of Jet Airways is stuck due to the breakdown of talks between the airlines. In the airline industry where most airlines are not publicly traded, a comparison with the global average may not be the best approach for valuation. For a deal to go through successfully it is important to also look at firm specific issues and not get fixated with global averages. Further with the heightened interest in Private equity, the bottom-up approach for calculating beta, for valuation purpose seems to be more appropriate approach.

Capital Asset Pricing Model (CAPM) revisited

The earlier paper discussed the workings of Capital Asset Pricing Model (CAPM) which is the most preferred risk/return model used by the finance fraternity. This model is used to calculate the expected return on investment (also known as the hurdle rate). However as argued by its critiques, it places very high reliance on one variable – ***the beta.*** If CAPM with all its assumptions is right, then the difference in the expected rate of return between two stocks is attributed solely to the difference in beta of the stocks.

$$\textit{Expected rate of return} = Rf + \beta\,(Rm - Rf)$$

Rf = Risk-free rate (Government bond yield).
β = Beta of the stock.
Rm = Market return (usually of a broad based index).

Since the risk -free rate and the market return in CAPM for two stocks can be similar (assuming the same index for calculating market return has been considered), the difference in the expected return between two stocks would entirely depend on the beta of the stocks. Therefore while estimating the hurdle rate, the accuracy -of beta is of utmost importance.

Regression Beta

The most common method of calculating beta is through regression analysis.

Beta of the stock = Covariance of stock with market portfolio/ Variance of the market portfolio

Even though this method of calculating beta is extensively used, it is not the most accurate. It has been observed that the regression beta, especially in emerging markets like India, has a high standard error attached to it. If the standard error is abnormally high, then the value of the beta maybe erroneous and not be fit for valuation purpose e.g., if the beta of the stock is 1.2 with a standard error of 0.5 then this data is flawed to the extent that it could be anywhere in the range of 0.7-1.7.

There are also circumstances when the regression beta is not available. This situation can arise in the case of a private firm. The data for calculating regression beta may not be available even after the company has gone public due to lack of sufficient historic data. As an alternative the bottom-up approach of calculating beta is available. Although this approach includes additional workings as against a relatively simple calculation of top-down (regression) beta, the beta arrived from this method is more reliable

Every business entity has a different structure with respect to its operating model and capital structuring. The bottom up approach considers this difference. This is the main factor which makes bottom up beta superior than the regression beta.

Bottom-up beta can be computed by examining:

1. The nature of the business;
2. Operating leverage of the company;
3. Financial leverage of the company.

Nature of the business

The business of the company plays a fundamental role in determining the beta of the stock. If the company's products are discretionary nature i.e., if the consumer can live without the product or can delay its purchase, the beta of such a company will usually be on the higher side. On the other hand, a company which is engaged in the business of providing basic necessities such as food and clothing will generally have a lower beta for its stock.

Operating Leverage

The operating leverage refers to the cost structure of the company. It is the measure of the proportion of fixed cost to the overall cost. Generally if the fixed cost component is higher, the stock will tend to have a higher beta. By having a larger proportion of fixed cost, a company creates a fixed charge on their profit and loss account. In the good times, even with high fixed costs a company can remain profitable, but during a downturn it would find it difficult to sustain its profits. The airline industry where a large proportion of their costs are fixed in nature e.g., air craft leasing, fuel cost, employee cost, etc. the beta of companies operating in this sector will tend to be on a higher end. However companies in the Information Technology (IT) space, which require lower sunk costs, would in general have a lower beta. It is possible, however, for a company within the sector to have a lower beta e.g., a budget airline will generally have a lower beta than a full service airline. This is primarily due to the difference in the operating leverage.

The operating leverage for a company can be calculated by dividing the fixed cost component by the variable cost. However, one the predicaments faced while calculating a company's operating leverage is to segregate their costs between fixed and variable. For some companies it is still complicated to distinguish between some of its expenses such as selling and distribution expenses. Also, in today's globalization era where companies have investments in various countries, the policies in these countries would influence the accounting of its expenses. This can be illustrated by taking the example of two companies operating in the automobile sector, Ford in the U.S and Volkswagen which operates out of Germany. While the labour laws in US allow for companies to lay-off their workers, the German laws in this regard are more stringent. Due to the difference in the labour laws, Ford accounts for its labour costs as variable, and for VW they are considered as fixed expense.

To estimate the fixed and variable cost components of a company, the change in revenues of the firm have to be compared with the change in operating profits (earnings before interest and tax). It is prudent to compare these differentials over a certain time period, usually four -five years, as the figures of one particular year may not give the right picture. This figure when compared with the industry average would give an indication whether the company has a higher or lower operating leverage.

Financial Leverage

The financial leverage refers to the debt taken on by the firm. A company with high borrowing tends to have a higher beta. By taking on debt, even a relatively safe business can end up having a high beta. The moment a company takes on debt it creates a fixed cost in the form of interest payment. The very nature of these interest payments is that they have to be made not only during the good times, but even when the company is facing a downturn. This will lead to volatility in earnings, and therefore the company would end up with a higher.

Illustration: Calculating bottom-up beta for Tata Steel Limited

To calculate the bottom-up beta for Tata Steel, the industry average of the financial and operating leverage has to be considered. The following table contains a list of 14 comparable firms. The larger the sample size, the more accurate the beta as it reduces the standard error.

Company Name	Regression Beta	D/E Ratio	Effective tax rate %	Fixed/variable cost
SAIL	1.28	0.5	7.95	0.28
Tulsyan	0.98	3.46	9.15	0.05
Uttam Galva	1.18	1.87	8.98	0.05
Tayo	0.85	0.99	22.74	0.30
Sunflag Iron & Steel	1.31	0.67	10.31	0.14
Shree Precoated Steel	1.25	2.11	9.58	0.07
Shivalik Bimetals	0.78	1.03	10.77	0.16
National Steel	1.09	0.97	5.56	0.03
Mukand Ltd	1.51	4.08	9.80	0.19
Monnet Ispat	1.28	1.6	7.83	0.18
Mahindera Ugine Steel	1.31	0.71	7.85	0.13
Kalyani Steel	1.14	0.57	9.39	0.06
J S W Steel	1.16	1.3	6.08	0.20
Hisar Metal	1.16	4.9	10.50	0.03
Average (Simple)	**1.16**	**1.77**	**9.75**	**0.13**
Tata Steel	**1.14**	**0.4**	**30.66**	**0.32**

(Source: Prowess)

The beta of the stock reflects the risk embedded in the firm. A part of this risk comes from the business of the company, some from its operating leverage structure and the balance from the financial leverage which it carries on its balance sheet. The focus now is to first delineate from the industry beta the effect of financial and operating leverage. This would result in a number which is purely indicative business risk. This can be termed as unlevered industry beta.

Step 1: Unlevered Industry beta

Average regression beta = 1.16
Average debt-equity ratio = 1.77
Average effective tax-rate = 9.75%

Un-leveraged beta = Regression beta/ {1+ (1-tax-rate)*debt-equity ratio}
Un-leveraged beta = 1.16/ 1 + (1-.0.0975)*1.77 = 0.44

The above results in the effect of the financial leverage being eliminated. However the effect of operating leverage also needs to be addressed. This is done as follows:

Business beta = Unlevered beta/ {1+ (fixed to variable-ratio)}

Business beta = 0.44/ {1+ (0.13)} = 0.38

The figure of 0.38 purely reflects the risk of operating in the steel industry without taking into consideration leverage of any sort. This number forms the base from which Tata Steel's beta will be calculated. As Tata Steel operations are levered (both operationally and financially), the business beta has to be adjusted to capture this difference.

Step 2: Unlevered beta of Tata Steel (adjusted for its operating leverage)

Business beta = 0.38
Fixed/variable cost ratio = 0.32

Unlevered Beta of Tata Steel = 0.38 * (1+0.32) = 0.50

If Tata Steel had borrowed no money and the whole company was funded entirely by equity, then the beta of the stock would be 0.50. However, the company has a proportion of debt for which its beta needs to be adjusted.

Step 3: Levered Beta of Tata Steel (adjusted for its financial leverage)

Unlevered beta = 0.50
Debt-equity ratio = 0.4
Effective Tax rate = 30.66%
Levered beta = Unlevered beta * {1+ (1 - effective tax rate) * debt-equity ratio}
(1-tax rate is used in the formula as interest payments are tax deductible).

Levered beta of Tata Steel = 0.50 * {1+ (1-0.30)*0.4} = 0.64

The bottom-up beta for Tata Steel which captures the nature of the business in which it operates, its operating leverage and the financial leverage works out to be 0.64.

It can be argued that the bottom up beta is based on the foundation of regression beta and would suffer from the same fallacy as the regression beta. The explanation is that the regression beta is of a larger sample base (14 companies in this case) which reduces the standard error in statistical estimation. Assuming the regression beta for Tata Steel has a standard error of .50. The average industry regression beta would have a much lower error. Statistically, the standard error for the sample would be - individual error / square root of number of samples i.e. $0.50/\sqrt{14} = 0.13$

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