1. Cost of capital using CAPM

We have already worked on this problem in Assignment 7 (on CAPM). Over there, we made the simplifying assumption that firms were financed with only equity. Now, we will allow for the possibility of debt (and taxes). For your convenience, the entire question is reproduced below and it is indicated which parts you have solved already.

You are the chief financial officer of the conglomerate, Southeast Industries, Incorporated. The board of directors has asked you to estimate the opportunity cost of capital (capitalization rate) for one of the company’s two main divisions: the computer division (the other one is the family restaurant division). The costs of capital will be used to evaluate subsequent projects in the divisions.

Toward this end, you have collected stock return data for five peer group companies in the computer industry. An Excel spreadsheet file (the same one used for Assignment 7) is available on the website http://web.mit.edu/15.415CD.

The spreadsheet contains monthly excess return data (i.e., returns in excess of the one-month T-bill return) on a market portfolio (MARKET); a corporate bond portfolio (CB); the five peer group companies (IBM, TI, APPLE, HP, DEC); and S&P (ES&P).

Use Excel (or whatever package you are most comfortable with) to estimate the cost of capital for the computer division using data on the peer group and CAPM. For this part, ignore the effect of taxes (assuming zero marginal tax rates for all the companies under consideration). You may proceed as follows:

(a) (Already done in previous assignment) Calculate the market betas (relative to the market portfolio) $\beta_{im}$ for the common equity of each of the peer group companies and the corporate bond portfolio. You can just regress the security excess returns on the market excess return. That is, run the following regression.

$$r_{it} - r_{ft} = \alpha_i + \beta_{im}(r_{mt} - r_{ft}) + \epsilon_{it}$$

The slope coefficient is the estimate of the market beta of the stock or corporate bond portfolio. The excess returns, $r_{it} - r_{ft}$, are included in the file under the name of the asset. The excess returns, $r_{mt} - r_{ft}$, are included in the file under column labeled MARKET.
(b) Use the peer group company betas and the debt-to-capitalization ratio (debt-to-asset value ratio) information below to estimate the asset beta for the peer companies. Assume that the debt-to-capital ratios are constant over the period. The debt-to-capital ratio is the value of the firm’s debt divided by the value of the firm’s debt plus equity. Also, assume that the debt of the peer group firms has the same beta as the corporate bond portfolio included in the spreadsheet.

<table>
<thead>
<tr>
<th>Company</th>
<th>Debt-to-Capital Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Business Machines (IBM)</td>
<td>50.9%</td>
</tr>
<tr>
<td>Texas Instruments (TI)</td>
<td>35.6%</td>
</tr>
<tr>
<td>Apple (APPLE)</td>
<td>6.44%</td>
</tr>
<tr>
<td>Hewlett-Packard (HP)</td>
<td>39.9%</td>
</tr>
<tr>
<td>Digital Equipment (DEC)</td>
<td>15.3%</td>
</tr>
</tbody>
</table>

(c) Estimate the divisional cost of capital for the computer division using the average of the asset betas calculated above. Assume the riskless return is currently 4.0% and that the risk premium on the market, \( r_m - r_f \), is 5.9%.

(d) When we use the betas of peer group companies to estimate the cost of capital for the projects in our division, what important assumptions are being made?

(e) Discuss how your answer would change when the effect of taxes cannot be ignored. For simplicity, suppose that the marginal tax rate is 34% (instead of zero as assumed above) for all the companies under consideration.

2. Case on Financing Decisions

Read the case, “UST Inc.” that is included the Readings Package. Then, answer the following questions.

(a) Fill in Exhibit 4 of the case—the pro formas for the various restructuring alternatives. To do so, assume that operating income remains at $570 million. Also assume that all shares are repurchased at the market price of $30. Thus, a move to 10% debt (in market value terms) means buying back 10% of the shares (that is, 21 M shares) at a total cost of 21 M \times $30 = $630M.

(b) What do you expect UST’s bond rating and interest rate to be at each of the debt levels?

(c) What is the impact of increased leverage on earnings per share (EPS)? Why is this so? Which leverage ratio maximizes EPS?

(d) Can you quantify the economic benefits of debt to shareholders at each of the proposed debt levels? What about the costs?

(e) Articulate and defend an “optimal” capital structure for UST.