# Discussion Issue

□ Assume now that you are the CFO of Disney. The head of the movie business has come to you with a new big budget movie that he would like you to fund. He claims that his analysis of the movie indicates that it will generate a return on equity of 9.5%. Would you fund it?

  ◘ Yes. It is higher than the cost of equity for Disney as a company

  ◘ No. It is lower than the cost of equity for the movie business.

  ◘ What are the broader implications of your choice?

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# Estimating Bottom Up Betas & Costs of Equity: Vale

| Business | Sample | Sample size | Unlevered beta of business | Revenues | Peer Group EV/Sales | Value of Business | Proportion of Vale |
|---|---|---|---|---|---|---|---|
| Metals & Mining | Global firms in metals & mining, Market cap>$1 billion | 48 | 0.86 | $9,013 | 1.97 | $17,739 | 16.65% |
| Iron Ore | Global firms in iron ore | 78 | 0.83 | $32,717 | 2.48 | $81,188 | 76.20% |
| Fertilizers | Global specialty chemical firms | 693 | 0.99 | $3,777 | 1.52 | $5,741 | 5.39% |
| Logistics | Global transportation firms | 223 | 0.75 | $1,644 | 1.14 | $1,874 | 1.76% |
| *Vale Operations* | | | *0.8440* | *$47,151* | | *$106,543* | *100.00%* |

| Business | Unlevered beta | D/E ratio | Levered beta | Risk free rate | ERP | Cost of Equity |
|---|---|---|---|---|---|---|
| Metals & Mining | 0.86 | 54.99% | 1.1657 | 2.75% | 7.38% | 11.35% |
| Iron Ore | 0.83 | 54.99% | 1.1358 | 2.75% | 7.38% | 11.13% |
| Fertilizers | 0.99 | 54.99% | 1.3493 | 2.75% | 7.38% | 12.70% |
| Logistics | 0.75 | 54.99% | 1.0222 | 2.75% | 7.38% | 10.29% |
| Vale Operations | 0.84 | 54.99% | 1.1503 | 2.75% | 7.38% | 11.23% |

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# Vale: Cost of Equity Calculation – in nominal $R

- To convert a discount rate in one currency to another, all you need are expected inflation rates in the two currencies.

$$(1 + \$ \text{ Cost of Equity}) \frac{(1 + \text{Inflation Rate}_{\text{Brazil}})}{(1 + \text{Inflation Rate}_{\text{US}})} - 1$$

- From US $ to R$: If we use 2% as the inflation rate in US dollars and 9% as the inflation ratio in Brazil, we can convert Vale's US dollar cost of equity of 11.23% to a $R cost of equity:

$$\text{Cost of Equity}_{\text{Nominal R\$}} = (1 + \text{Cost of Equity}_{\text{US \$}}) \frac{(1 + \text{Expected Inflation}_{\text{R\$}})}{(1 + \text{Expected Inflation}_{\text{US \$}})} - 1$$

$$= (1.1123) \frac{(1.09)}{(1.02)} - 1 = 18.87\%$$

- Alternatively, you can compute a cost of equity, starting with the $R riskfree rate of 10.18%.

Cost of Equity in $R = = 10.18% + 1.15 (7.38%) = 18.67%

# Bottom up betas & Costs of Equity: Tata Motors & Baidu

- Tata Motors: We estimated an unlevered beta of 0.8601 across 76 publicly traded automotive companies (globally) and estimated a levered beta based on Tata Motor's D/E ratio of 41.41% and a marginal tax rate of 32.45% for India:

  Levered Beta for Tata Motors = 0.8601 (1 + (1-.3245) (.4141)) = 1.1007

  Cost of equity for Tata Motors (Rs) = 6.57% + 1.1007 (7.19%) = 14.49%

- Baidu: To estimate its beta, we looked at 42 global companies that derive all or most of their revenues from online advertising and estimated an unlevered beta of 1.30 for the business. Incorporating Baidu's current market debt to equity ratio of 5.23% and the marginal tax rate for China of 25%, we estimate Baidu's current levered beta to be 1.3560.

  Levered Beta for Baidu = 1.30 (1 + (1-.25) (.0523)) = 1.356

  Cost of Equity for Baidu (Renmimbi) = 3.50% + 1.356 (6.94%) = 12.91%

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# Bottom up Betas and Costs of Equity: Deutsche Bank

☐ We break Deutsche Bank down into two businesses – commercial and investment banking.

| Business | Sample used | Sample size | Median Levered Beta | Deutsche Net Revenues in 2012 | Proportion |
|---|---|---|---|---|---|
| Banking | European diversified banks | 84 | 1.0665 | 19,019 mil € | 54.86% |
| Investment Banking | Global investment banks | 58 | 1.2550 | 15,648 mil € | 45.14% |
| Deutsche Bank | | | 1.1516 | 34,667 mil € | |

☐ We do not unlever or relever betas, because estimating debt and equity for banks is an exercise in futility. Using a riskfree rate of 1.75% (Euro risk free rate) and Deutsche's ERP of 6.12%:

| Business | Beta | Cost of Equity |
|---|---|---|
| Commercial banking | 1.0665 | 1.75%+1.0665 (6.12%) = 8.28% |
| Investment Banking | 1.2550 | 1.75%+1.2550 (6.12%) = 9.44% |
| Deutsche Bank | 1.1516 | 1.75%+1.1516 (6.12%) = 8.80% |

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# Estimating Betas for Non-Traded Assets

☐ The conventional approaches of estimating betas from regressions do not work for assets that are not traded. There are no stock prices or historical returns that can be used to compute regression betas.

☐ There are two ways in which betas can be estimated for non-traded assets

   ◻ Using comparable firms
   ◻ Using accounting earnings

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# Using comparable firms to estimate beta for Bookscape

| Company Name | Industry | Market Capitalization | Levered Beta | Marginal tax rate | Gross D/E ratio | Cash/Firm Value | $R^2$ |
|---|---|---|---|---|---|---|---|
| Red Giant Entertainment | Publishing | $2.13 | 0.69 | 40.00% | 0.00% | 0.05% | 0.1300 |
| CTM Media Holdings | Publishing | $25.20 | 1.04 | 40.00% | 17.83% | 33.68% | 0.1800 |
| Books-A-Million | Book Stores | $38.60 | 1.42 | 40.00% | 556.55% | 4.14% | 0.1900 |
| Dex Media | Publishing | $90.50 | 4.92 | 40.00% | 3190.39% | 7.86% | 0.2200 |
| Martha Stewart Living | Publishing | $187.70 | 1.11 | 40.00% | 19.89% | 15.86% | 0.3500 |
| Barnes & Noble | Book Stores | $939.30 | 0.11 | 40.00% | 164.54% | 3.22% | 0.2600 |
| Scholastic Corporation | Publishing | $953.80 | 1.08 | 40.00% | 21.41% | 1.36% | 0.2750 |
| John Wiley | Publishing | $2,931.40 | 0.81 | 40.00% | 29.58% | 5.00% | 0.3150 |
| Washington Post | Publishing | $4,833.20 | 0.68 | 40.00% | 21.04% | 16.04% | 0.2680 |
| News Corporation | Publishing | $10,280.40 | 0.49 | 40.00% | 8.73% | 24.05% | 0.2300 |
| Thomson Reuters | Publishing | $31,653.80 | 0.62 | 40.00% | 26.38% | 1.68% | 0.2680 |
| **Average** | | | **1.1796** | **40.00%** | **368.76%** | **10.27%** | **0.2442** |
| **Median** | | | **0.8130** | **40.00%** | **21.41%** | **5.00%** | **0.2600** |

Unlevered beta for book company = 0.8130/ (1+ (1-.4) (.2141)) = 0.7205

Unlevered beta for book business = 0.7205/(1-.05) = 0.7584

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# Estimating Bookscape Levered Beta and Cost of Equity

- Because the debt/equity ratios used in computing levered betas are market debt equity ratios, and the only debt equity ratio we can compute for Bookscape is a book value debt equity ratio, we have assumed that Bookscape is close to the book industry median market debt to equity ratio of 21.41 percent.

- Using a marginal tax rate of 40 percent for Bookscape, we get a levered beta of 0.8558.

  Levered beta for Bookscape = $0.7584[1 + (1 - 0.40)(0.2141)] = 0.8558$

- Using a riskfree rate of 2.75% (US treasury bond rate) and an equity risk premium of 5.5%:

  Cost of Equity = $2.75\% + 0.8558(5.5\%) = 7.46\%$

# Is Beta an Adequate Measure of Risk for a Private Firm?

□ Beta measures the risk added on to a diversified portfolio. The owners of most private firms are not diversified. Therefore, using beta to arrive at a cost of equity for a private firm will

  a. Under estimate the cost of equity for the private firm

  b. Over estimate the cost of equity for the private firm

  c. Could under or over estimate the cost of equity for the private firm

# Total Risk versus Market Risk

- Adjust the beta to reflect total risk rather than market risk. This adjustment is a relatively simple one, since the R squared of the regression measures the proportion of the risk that is market risk.

  - Total Beta = Market Beta / Correlation of the sector with the market

- In the Bookscape example, where the market beta is 0.8558 and the median R-squared of the comparable publicly traded firms is 26.00%; the correlation with the market is 50.99%.

$$\frac{\text{Market Beta}}{\sqrt{\text{R squared}}} = \frac{0.8558}{.5099} = 1.6783$$

  - Total Cost of Equity = 2.75 + 1.6783 (5.5%) = 11.98%

# Application Test: Estimating a Bottom-up Beta

- Based upon the business or businesses that your firm is in right now, and its current financial leverage, estimate the bottom-up unlevered beta for your firm.

- Data Source: You can get a listing of unlevered betas by industry on my web site by going to updated data.

# From Cost of Equity to Cost of Capital

- ☐ The cost of capital is a composite cost to the firm of raising financing to fund its projects.

- ☐ In addition to equity, firms can raise capital from debt

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# What is debt?

- ☐ General Rule: Debt generally has the following characteristics:
  - ☐ Commitment to make fixed payments in the future
  - ☐ The fixed payments are tax deductible
  - ☐ Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.

- ☐ As a consequence, debt should include
  - ☐ Any interest-bearing liability, whether short term or long term.
  - ☐ Any lease obligation, whether operating or capital.

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# Estimating the Cost of Debt

- □ If the firm has bonds outstanding, and the bonds are traded, the yield to maturity on a long-term, straight (no special features) bond can be used as the interest rate.

- □ If the firm is rated, use the rating and a typical default spread on bonds with that rating to estimate the cost of debt.

- □ If the firm is not rated,

  - ◻ and it has recently borrowed long term from a bank, use the interest rate on the borrowing or

  - ◻ estimate a synthetic rating for the company, and use the synthetic rating to arrive at a default spread and a cost of debt

- □ The cost of debt has to be estimated in the same currency as the cost of equity and the cash flows in the valuation.

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