HURDLE RATES V: BETAS – THE REGRESSION APPROACH

A regression beta is just a statistical number
Set Up and Objective
1: What is corporate finance
2: The Objective: Utopia and Let Down
3: The Objective: Reality and Reaction

The Investment Decision
Invest in assets that earn a return greater than the minimum acceptable hurdle rate

Hurdle Rate
4. Define & Measure Risk
5. The Risk free Rate
6. Equity Risk Premiums
7. Country Risk Premiums
8. Regression Betas
9. Beta Fundamentals
10. Bottom-up Betas
11. The "Right" Beta
12. Debt: Measure & Cost
13. Financing Weights

Investment Return
14. Earnings and Cash flows
15. Time Weighting Cash flows
16. Loose Ends

The Financing Decision
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations

Financing Mix
17. The Trade off
18. Cost of Capital Approach
19. Cost of Capital: Follow up
20. Cost of Capital: Wrap up
21. Alternative Approaches
22. Moving to the optimal

Financing Type
23. The Right Financing

The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business

Dividend Policy
24. Trends & Measures
25. The trade off
26. Assessment
27. Action & Follow up
28. The End Game

Valuation
29. First steps
30. Cash flows
31. Growth
32. Terminal Value
33. To value per share
34. The value of control
35. Relative Valuation

36. Closing Thoughts
Estimating Beta

- The standard procedure for estimating betas is to regress stock returns ($R_j$) against market returns ($R_m$) -
  
  $$R_j = a + b R_m$$
  
  where $a$ is the intercept and $b$ is the slope of the regression.

- The slope of the regression corresponds to the beta of the stock, and measures the riskiness of the stock.

- The $R$ squared ($R^2$) of the regression provides an estimate of the proportion of the risk (variance) of a firm that can be attributed to market risk. The balance (1 - $R^2$) can be attributed to firm specific risk.
The intercept of the regression provides a simple measure of performance during the period of the regression, relative to the capital asset pricing model.

\[ R_j = R_f + b (R_m - R_f) \]

\[ = R_f (1-b) + b R_m \]

\[ R_j = a + b R_m \]

\[ ...... \text{Capital Asset Pricing Model} \]

\[ ...... \text{Regression Equation} \]

If

\[ a > R_f (1-b) \] .... Stock did better than expected during regression period

\[ a = R_f (1-b) \] .... Stock did as well as expected during regression period

\[ a < R_f (1-b) \] .... Stock did worse than expected during regression period

The difference between the intercept and \( R_f (1-b) \) is Jensen's alpha. If it is positive, your stock did perform better than expected during the period of the regression.
Setting up for the Estimation

- Decide on an estimation period
  - Services use periods ranging from 2 to 5 years for the regression
  - Longer estimation period provides more data, but firms change.
  - Shorter periods can be affected more easily by significant firm-specific event that occurred during the period.

- Decide on a return interval - daily, weekly, monthly
  - Shorter intervals yield more observations, but suffer from more noise.
  - Noise is created by stocks not trading and biases all betas towards one.

- Estimate returns (including dividends) on stock
  - Return = \((\text{Price}_{\text{End}} - \text{Price}_{\text{Beginning}} + \text{Dividends}_{\text{Period}})/ \text{Price}_{\text{Beginning}}\)
  - Included dividends only in ex-dividend month

- Choose a market index, and estimate returns (inclusive of dividends) on the index for each interval for the period.
Choosing the Parameters: Disney

- **Period used:** 5 years
- **Return Interval = Monthly**
- **Market Index:** S&P 500 Index.

For instance, to calculate returns on Disney in December 2009,
- Price for Disney at end of November 2009 = $30.22
- Price for Disney at end of December 2009 = $32.25
- Dividends during month = $0.35 (It was an ex-dividend month)
- Return = ($32.25 - $30.22 + $0.35)/$30.22 = 7.88%

To estimate returns on the index in the same month
- Index level at end of November 2009 = 1095.63
- Index level at end of December 2009 = 1115.10
- Dividends on index in December 2009 = 1.683
- Return = (1115.1 – 1095.63+1.683)/ 1095.63 = 1.78%
Disney’s Historical Beta

Return on Disney = .0071 + 1.2517 Return on Market

R² = 0.73386

(0.10)
Analyzing Disney’s Performance

- **Intercept = 0.712%**
  - This is an intercept based on monthly returns. Thus, it has to be compared to a monthly riskfree rate.
  - Between 2008 and 2013
    - Average Annualized T.Bill rate = 0.50%
    - Monthly Riskfree Rate = 0.5%/12 = 0.042%
    - Riskfree Rate (1-Beta) = 0.042% (1-1.252) = -0.0105%

- **The Comparison is then between**
  - Intercept versus Riskfree Rate (1 - Beta)
  - 0.712% versus 0.0105%
  - Jensen’s Alpha = 0.7122% - (-0.0105)% = 0.723%

- **Disney did 0.723% better than expected, per month, between October 2008 and September 2013**
  - Annualized, Disney’s annual excess return = (1.00723)^12 -1= 9.02%

- **This positive Jensen’s alpha is a sign of good management at the firm.**
  - True
  - False
Estimating Disney’s Beta

- Slope of the Regression of 1.25 is the beta
- Regression parameters are always estimated with error. The error is captured in the standard error of the beta estimate, which in the case of Disney is 0.10.
- Assume that I asked you what Disney’s true beta is, after this regression.
  - What is your best point estimate?
  - What range would you give me, with 67% confidence?
  - What range would you give me, with 95% confidence?
The Dirty Secret of “Standard Error”

Distribution of Standard Errors: Beta Estimates for U.S. stocks

Number of Firms

Standard Error in Beta Estimate
Breaking down Disney’s Risk

- **R Squared = 73%**
- **This implies that**
  - 73% of the risk at Disney comes from market sources
  - 27%, therefore, comes from firm-specific sources
- **The firm-specific risk is diversifiable and will not be rewarded.**
- **The R-squared for companies, globally, has increased significantly since 2008. Why might this be happening?**
  - The increase in R-squared could be due to better market integration, improved risk management practices, or changes in market structure.
- **What are the implications for investors?**
  - Investors may need to adjust their strategies to account for the increased diversifiable risk.
Beta Estimation: Using a Service (Bloomberg)
Estimating Expected Returns for Disney in November 2013

- Inputs to the expected return calculation
  - Disney’s Beta = 1.25
  - Riskfree Rate = 2.75% (U.S. ten-year T.Bond rate in November 2013)
  - Risk Premium = 5.76% (Based on Disney’s operating exposure)

Expected Return = Riskfree Rate + Beta (Risk Premium)
= 2.75% + 1.25 (5.76%) = 9.95%
Use to a Potential Investor in Disney

- As a potential investor in Disney, what does this expected return of 9.95% tell you?
  - This is the return that I can expect to make in the long term on Disney, if the stock is correctly priced and the CAPM is the right model for risk,
  - This is the return that I need to make on Disney in the long term to break even on my investment in the stock
  - Both

- Assume now that you are an active investor and that your research suggests that an investment in Disney will yield 12.5% a year for the next 5 years. Based upon the expected return of 9.95%, you would
  - Buy the stock
  - Sell the stock
How managers use this expected return

- Managers at Disney
  - need to make at least 9.95% as a return for their equity investors to break even.
  - this is the hurdle rate for projects, when the investment is analyzed from an equity standpoint

- In other words, Disney’s cost of equity is 9.95%.

- What is the cost of not delivering this cost of equity?
Application Test: Analyzing the Risk Regression

- If you can get a beta regression page (or output) for your company against a market index, answer the following questions:
  - How well or badly did your stock do, relative to the market, during the period of the regression?
  - Intercept - (Riskfree Rate/n) (1- Beta) = Jensen’s Alpha where n is the number of return periods in a year (12 if monthly; 52 if weekly)
  - What proportion of the risk in your stock is attributable to the market? What proportion is firm-specific?
  - What is the historical estimate of beta for your stock? What is the range on this estimate with 67% probability? With 95% probability?
  - Based upon this beta, what is your estimate of the required return on this stock?
    Riskless Rate + Beta * Risk Premium
Task
Break down the beta regression for your company

Read
Chapter 4