

## Built Up Betas and the Cost of Equity

**Objective:** The objective of this assignment is to introduce students to how to calculate beta using comparable companies. Not only is this approach the correct one to use in general but is especially appropriate when a firm is either a private company or a publicly traded company that has been trading only a short time or only infrequently. A secondary goal is to show the impact that leverage (the use of debt) has on risk (beta).

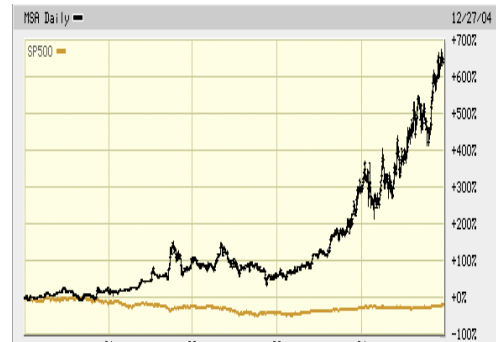
**Company:** Mine Safety Appliances (Ticker: MSA, Website: <http://www.msanet.com/>)

You'd have to think long and hard to come up with a name less sexy than "Mine Safety." Yet the lack of sex appeal and minimal analyst exposure<sup>1</sup> has not prevented Mine Safety from increasing its earnings an average 26.2% per annum exceeding that of the S&P and such Wall Street darlings as Cisco and Intel (earnings decline an average of 19.1% per year).

Mining a rich vein of safety products for hazardous workplaces, MSA is the largest company in the world dedicated solely to producing a complete range of equipment and systems for worker and plant protection in fire service, construction, chemical manufacturing, military and mining. The Company's principal products include respiratory protective equipment that is air-purifying, air-supplied and self-contained in design; instruments that monitor and analyze workplace environments and control industrial processes; thermal imaging cameras that enable firefighters and rescue workers to see through smoke and darkness, and personal protective products including head, eye, face and hearing protectors and fall protection equipment. On 11/3/2004, MSA announced



record 3<sup>rd</sup> quarter sales and earnings with growth occurring primarily in the company's North American segment, led by strong shipments of self-contained breathing apparatus (SCBA) and thermal imaging cameras (TICs) to the fire service market, and Advanced Combat Helmets and gas masks to homeland security and military markets. The company's broad range of sophisticated new products are selling well, assisted by higher government funding to support the fire service, homeland security and the war on terrorism.”



**Competitors (Publicly Traded):** Abatix Corp (ABIX), DHB Industries Inc. (DHB), and Lakeland Industries Inc (LAKE).

<sup>1</sup>Only five analysts currently following the company in comparison to 36 analysts which follow Intel (Nasdaq: INTC), or the 39 that follow Cisco Systems (Nasdaq: CSCO).

### Assumptions:

| Item                         | Assumption  |
|------------------------------|---|
| Beta                         | Use 60 months of the most recent data given in the "Returns" worksheet to calculate the beta for each firm using the SLOPE command in Excel.  |
| Marginal tax rate            | Use the trailing twelve month (TTM) marginal tax rate for our subject firm (Mine Safety Appliances).  |
| Riskfree rate                | Use the 10 year Treasury bond as the appropriate benchmark.   |
| Debt                         | Assume that MSA has an implied bond rating of AAA (based on Altman's EM-Z score) and a 10 year debt maturity. To calculate the <b>pre-tax cost of debt</b> which you will use as the discount rate to calculate the present value of the operating lease (Value of Off-Balance Sheet Debt), add the 10 year Treasury (located in the "Treasury Rates" worksheet) to the Default Spread (located in the "Corporate Bond Spreads" worksheet). Use the most recent debt outstanding for each firm with respect to On Balance Sheet Debt. |
| Operating lease              | We will assume based on the operating lease payment for Year 2008 of \$2,657 that the Thereafter amount of \$9,075 represents 4 additional years worth of operating leases with the lease payment in each of the four years being an equal amount.  |
| Shares Outstanding           | Use the most recent shares outstanding for each firm  |
| Equity                       | Calculate the market value of equity (aka market cap) for each firm using the most recent shares outstanding for each firm multiplied by the price per share (given in the "Comps" worksheet).  |
| Risk premium ( $R_M - r_F$ ) | 5.5%  |
| NA                           | Set NA = 0 in the Financial Statements (Disclosure spreadsheet)   |
| Date of Analysis             | Assume that the date of your analysis is as of <b>December 24, 2004</b> .   |

**Assignment:** Download the MSA data from my website and use the downloaded spreadsheet to answer the following questions (all work should be done on this spreadsheet). The assumptions for each calculation are given on the preceding page. Please highlight your answers in **yellow** in the worksheet templates provided:

1. Firm Betas (5 points): Calculate the betas for the comparable firms using either the Regression option<sup>2</sup> under Data Analysis in the Excel menu or the SLOPE command.
2. Total on Balance Sheet Debt (5 points): Calculate the total amount of On Balance Sheet debt using the appropriate 10Q spreadsheet for each firm. In calculating the debt for each comparable company, use the *most recent* figure given in the spreadsheet for each firm. Assume that the book value of debt equals the market value of debt.
3. Market Value of Equity also known as Market Cap (5 points): Calculate the total market value of equity using the appropriate 10Q spreadsheet for each firm and the stock price for each firm located in the “Comps” worksheet.
4. Off Balance Sheet Debt (5 Points): Calculate the Present Value of Operating Leases.
5. Estimate the Beta for MSA using Comparables (70 points):
  - a. Method 1: Average the Betas and Debt/Equity and Then Unlever the Average Beta. Calculate the levered beta for MSA using the “BuiltUp Beta - Method1” template. Note that in re-leveraging the beta, the debt to equity ratio for MSA includes both on balance sheet and off-balance sheet debt.
  - b. Method 2: Unlever the Beta for Each Comparable Firm and then Average the Unlevered Betas. Calculate the levered beta for MSA using the “BuiltUp Beta – Method2” template. Discuss whether the estimate of beta for MSA using the two approaches is similar.
  - c. Method 3: Fundamental Beta: Rosenberg and Marather (1979) suggest that fundamental information about a firm (the independent X variables) can be used together with the historical levered beta (the Y variable) to obtain superior predictors of future betas. Fundamental information that we use include the firm's dividend yield, the coefficient of variation in operating income (standard deviation of operating income divided by the mean of operating income), the size of the firm as measured by its total assets, its debt/equity ratio (in book value terms), and its expected growth rate in earnings per share. Using the data provided in the “Inputs for Fundamental Beta” worksheet, use the Regression option under Data Analysis to calculate the imputed levered beta for MSA. To calculate the levered beta for MSA you will need to first calculate the X variables for MSA. More specifically, use the “MSA 10K” worksheet to obtain the coefficient of variation of operating income (use 5 years

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<sup>2</sup>If you do not see the Data Analysis option under the Tools submenu in Excel, click on the Add-Ins option under the Tools submenu then click on Analysis Toolpak and then click OK. You should now see the Data Analysis option under the Tools submenu.

worth of data). Use the “MSA 10Q” in conjunction with the “Comps” worksheet to obtain the dividend yield. Use the “MSA 10Q” to obtain the On Balance Sheet Debt to Book Value of Shareholder Equity Ratio for the trailing twelve months. For the constant average growth rate (CAGR), refer to the “Earnings Estimate (MSA)” worksheet and use the MEAN Estimate of LT Growth Rate. For firm size (Total Assets) use the “MSA 10Q”.

6. Estimate the Cost of Equity for Mine Safety Appliances (10 points): Calculate the cost of equity for MSA under each of the three methods using the Capital Asset Pricing Model (CAPM). The cost of equity is the discount rate that shareholders use to discount back the cashflows they receive (dividends, stock buybacks, etc.). Use the 10 year Treasury bond for the riskfree rate.

Please turn in a hard copy of your solutions together with your disk, which shows all work on your spreadsheet. Since this is an individual effort, any student caught cheating will be given an F on this assignment.