

# **Bloom's Taxonomy: Progression in the Finance Lab**

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***ABSTRACT:** Bloom's Taxonomy of learning, developed by Benjamin Bloom, is often used by educators to develop and measure goals for the learning process. Bloom's cognitive domain; knowledge, understanding, application, analysis, synthesis and evaluation is based on a hierarchy of learning which moves from simple to complex and concrete to abstract. Students in finance courses learn basic theory, but also must understand how to apply and use that theory. Students want to know how they will use classroom information in their lives after graduation. This presentation discusses a series of financial lab exercises that demonstrate to students that finance theory has real value in the business world, thus linking "abstract" course content to the real world. The exercises align with Bloom's Taxonomy, starting with acquisition of knowledge goals and moving toward the development of higher level critical thinking goals.*

## **INTRODUCTION**

Bloom's taxonomy, developed by Benjamin Bloom and a group of measurement specialists in 1956 has been used by educators for decades to develop goals for the learning process (Bloom, 1956). Bloom's cognitive domain, concerning knowledge acquisition and retention, is based on a hierarchy of learning goals moving from simple to complex and concrete to abstract. The hierarchy starts with knowledge, and the moves to comprehension, application, analysis, synthesis and evaluation. (Insert Exhibit 1 here.) The levels were cumulative; in other words, a learner needed to master the earlier levels in order to succeed with more complex learning objectives. In addition to measurement, Bloom expected that the taxonomy could be used to facilitate communication among educators across both subject matter and education levels. The taxonomy has been widely accepted and used in education and education research, with the original translated into 22 languages (Krathwohl, 2002). Bloom's Taxonomy has also been dissected into action verbs and activities, for example, by St. Edward's University Center for Teaching Excellence (Exhibit 3).

Students in finance courses learn basic theory, but also must understand how to apply and use that theory. Students in any class often want to know how they will use the information they are learning in their courses in their life after school. A series of financial lab exercises can demonstrate to students that finance theory has real value in the business world. Using the theory in practice also is a means of cementing concepts.

## **LITERATURE REVIEW**

Bloom's Taxonomy of Educational Objectives is the most renowned educational categorization. Krathwohl, Bloom and Maisa (1964) added to this work with the Affective Domain Taxonomy: receiving, responding, valuing, organizing and internalizing. The

taxonomies became a heuristic for instructional design, a way that instructors could gauge whether they were teaching comprehension, analysis or synthesis and whether students learned to evaluate the information taught.

Shulman (2002) discussed mankind's desire to categorize, and proposed a new category, pedagogical content knowledge (PCK), in Shulman's table of learning: 1) Engagement and Motivation, 2) Knowledge and Understanding, 3) Performance and Action, 4) Reflection and Critique, 5) Judgment and Design, and 6) Commitment and Identity. Shulman contended that learning begins with engagement, which in turn leads to understanding. Once understood, then action, reflection and judgment are possible. In commitment, "we become capable of professing our understandings and our values, our faith and our love, our skepticism and our doubts, internalizing those attributes and making them integral to our identities." Once there is commitment, then the cycle begins again with engagement with new subject material.

The taxonomies are useful in looking at how critical thinking can be incorporated into the curriculum and evaluated. Sormunen (1992) noted that critical thinking can be introduced into the curriculum through case studies, group projects, simulations, computer applications, and role playing, with Bloom's action verbs used to define critical thinking applications. Then, critical thinking assessment can be evaluated by clarifying the reason for assessment, clarifying performance to be evaluated, designing exercises and designing a performance rating plan.

Bloom's Taxonomy can be applied in a variety of educational situations. Reeves (1990) showed how both the original and affective domain taxonomies can be used in a business ethics course. Handy (2005) discussed activities in accounting classes that can promote learning at higher levels, including cases, current events, projects using the *Wall Street Journal*, technology-driven assignments, flowcharting projects, developing business plans, debates, guest speakers and company tours, interviews, professional experiences and research projects. Betts (2008) looked at graduate course design using Bloom's taxonomy, recognizing the need to review basic material, along with the desire for high level class discussions. He rated course elements that emphasized knowledge and understanding (online quizzes, supplemental lectures), application and analysis (discussion board, essay quizzes) and synthesis and evaluation (individual projects, group projects, management portfolio). Tyran (2010) used the taxonomy to support the design of undergraduate and graduate decision support system courses. Athanassiou (2003) found that using the taxonomy made classrooms more student-centered because students had increased awareness and control of their own cognitive development. The taxonomy provided students with a tool to evaluate their own performance. Clabaugh (1995) used Bloom's taxonomy in a professional selling course designed to develop progressively higher critical thinking skills through cases, lectures and presentations.

The taxonomy has been used to gauge how much of a course's learning is focused on lower levels of learning vs. the more creative levels. A study of accounting textbooks (Davidson and Baldwin, 2005) found that about 48% of end of chapter exercises were written at the knowledge, comprehension and application levels, 43% at the analysis level and 9% at the synthesis and evaluation levels. Ven (2005) used the taxonomy to determine the levels of professional competency requirements in information occupations in the U.S., Australia and Taiwan, finding that 45% of information occupational competencies are in the synthesis area, followed by application and analysis (20% each) and knowledge and comprehension (5% each). The taxonomy can be used for assessment. Simeone (2007) used the taxonomy to develop a course-embedded assessment tool designed to help faculty gather information needed to evaluate student performance in the classroom.

## **APPLYING THE TAXONOMY**

In an introductory course, all of the material could be presented at the knowledge level. Students generally enter the course with no prior background or knowledge about the subject material. They know some of the language of finance through their accounting prerequisites, and they know some of the mathematical tools that the finance course will use through their statistics prerequisite classes. However, to actually apply the finance principles taught, students must do more than memorize facts; they also must understand the material, and once they have achieved understanding, apply that knowledge. Bloom's taxonomy divided comprehension into three steps. First is translation, the ability to use abstract material without losing the meaning of that material. The exercises used in class require students to briefly write up their work, demonstrating their ability to translate finance terms in their own language. Next in comprehension is interpretation, where students demonstrate their understanding of the material by creating a graph, for example. Here they create a picture of interrelationships in the data. The final step in comprehension is extrapolation, the ability to predict probable consequences or trends. This could mean looking at a graph to see what might occur in the future.

In application, students move beyond what they know and use their knowledge to analyze the unfamiliar or create new ideas. While extrapolation begins this analysis, application moves beyond this to use the material to solve new problems. Students learn that no two sets of financial statements are exactly alike; no two company situations are exactly alike. Students move on to see that each analysis is unique. In analysis, students break the subject material into parts, and look for the interrelationships among the parts. In analysis, Bloom notes the analysis of elements, for example, recognizing unstated assumptions, separating facts from opinion, and separating evidence from conclusions. Students learn that finance, even though it is a math course, can be as much art as science. As analysts, they must make assumptions and be comfortable with gray areas. Bloom next looks at analysis of relationships, which include causality and relevance of the material. Students can be overwhelmed with the data available from multiple sources, some of which is conflicting. The third aspect of analysis is analysis of organizational principles, looking at ideologies, points of view and defending a position. The students' analysis must make logical assumptions, must find a way of reconciling contradictory information and must look at the relationship of the subject company with itself over time and with its competitors.

In synthesis, the previous analyses become part of a new, integrated whole. Synthesis can create a new action plan to provide an effective solution to a new problem. No company is problem-free. After identifying a company's weaknesses and strengths, students can use their analysis to see who the strengths can be used and the weaknesses corrected. The final level in Bloom's taxonomy is evaluation. Ultimately, students must reach a conclusion about the company they are analyzing – is it a good investment, and if so, at what price?

## **CONCLUSION**

Even beginning students can develop comprehensive company valuations when they are taken step by step through the information gathering, comprehension and application steps of Bloom's Taxonomy. The exercises described in this paper have been used in an introductory finance class with lectures followed by a weekly lab run by teaching assistants. The exercises

start with small information gathering and comprehension exercises and culminate in a comprehensive report valuing a firm using discounted cash flow and multiples valuation. The lab exercises can be used to reinforce theoretical concepts taught in lectures. Students also appreciate seeing real world applications of the theory learned in class and as a side benefit, take information sources that can be used in their lives beyond the classroom.

Reeves (1990) noted that “Bloom’s taxonomy of cognitive educational objectives may be viewed as descriptions of intended behavior. This includes expected changes in acting, thinking and feeling of students that result from units on instruction in any discipline.” These exercises are designed to provide this experience in finance. Students need basic knowledge before they can understand how the principles of finance will impact them in more advanced courses, if they are finance majors, and in their personal lives.

### The Exercises

Exercise	Bloom’s Taxonomy
Introduction to the Financial Markets Lab	<b>Knowledge of specifics:</b> finding data bases that list companies, finding data bases the allow you to download financial statements <b>Knowledge of methodology:</b> learning to use the lab software and hardware.
Introduction to a Company	<b>Knowledge of specifics:</b> extends the first lab in which students download financial statements. This lab requires them to search through the statements and notes accompanying financial statements to find specific information. <b>Comprehension:</b> Based on data in the financial reports, students must identify two risks faced by the company summarize these risks <b>Application:</b> Students must search the business press and find articles discussing the risks they previously identified.
Economic and Industry Analysis	<b>Knowledge:</b> find industry data for a company and identify relevant economic variables <b>Analysis:</b> based on information from the industry and economic reports, draw a conclusion about what part of the business cycle the economy is in now, determine what impact the relevant economic variables will have on a specific company and determine whether a specific company is likely to perform better or worse than the overall industry.
EBITDA Coverage Ratio	<b>Knowledge:</b> find specific numbers from a company’s income statement, cash flow statement and notes to the financial statements <b>Application:</b> solve a numerical problem using inputs discovered from the company’s financial reports
Finding Economic Value Added and Market Value Added	<b>Knowledge:</b> find specific numbers from a company’s financial statements and from online data bases. <b>Application:</b> use the data gathered to solve a numerical problem
Yield Curves	<b>Knowledge:</b> Find sources of information about Treasury interest rates

	<p><b>Comprehension:</b> Graph the data found, using excel</p> <p><b>Analysis:</b> Speculate about the implications of the shape of the yield curve for the economy</p>
Lines of Credit	<p><b>Knowledge:</b> find company information</p> <p><b>Application:</b> use company information in an online line of credit calculator</p> <p><b>Analysis:</b> Speculate about why differing inventory systems impact the amount of credit a firm can have</p>
Calculating Sales Growth	<p><b>Knowledge:</b> find sources of sales and sales growth estimates made by analysts</p> <p><b>Application:</b> use textbook formula for computing stock returns and apply it finding a sales growth rate</p>
Understanding Risk	<p><b>Knowledge:</b> find and download stock price data and index data. Learn basic excel functions</p> <p><b>Comprehension:</b> Use basic excel functions to make calculations using downloaded data</p> <p><b>Application:</b> Use the formula from the Calculating Sales Growth exercise to calculate monthly return.</p> <p><b>Analysis:</b> Draw conclusions about a firm's risk using information from the textbook and lectures.</p>
Stock Returns over Time	<p><b>Knowledge:</b> Find company specific and market data</p> <p><b>Comprehension:</b> Use excel chart wizard to create graphs</p> <p><b>Application:</b> Use textbook formulas in excel to calculate various returns</p>
Interpreting Beta	<p><b>Knowledge:</b> learn the mechanics of running a regression analysis using excel</p> <p><b>Comprehension:</b> understand the meaning behind the regression statistics generated by an excel regression</p> <p><b>Application:</b> use an excess return formula to calculate whether a firm has earned below or above average returns in a specified period</p> <p><b>Analysis:</b> Using the regression statistics and finance theory analyze the kind of risk – firm specific or market risk – for a company.</p>
Bonds	<p><b>Knowledge:</b> find information concerning bonds</p> <p><b>Application:</b> use this information to find the price of the bond using textbook formulas</p> <p><b>Analysis:</b> Speculate about why the calculated price is different from the market price</p>
Cost of Equity – Capital Asset Pricing and Bond Yield + Risk Premium Models	<p><b>Knowledge:</b> find specific company information (bond yield) and market information (risk free rate)</p> <p><b>Comprehension:</b> use real world data in textbook equations to calculate cost of equity</p>
Cost of Equity – Dividend Growth Model	<p><b>Knowledge:</b> find specific company information (price, dividend, dividend growth rate)</p> <p><b>Comprehension:</b> understand substitutions, if desired information</p>

	<p>cannot be found, for example, using an earnings growth rate if a dividend growth rate can't be found</p> <p><b>Application:</b> Use the information to calculate cost of equity</p> <p><b>Analysis:</b> explain the importance of growth rate to the final answer.</p> <p><b>Evaluation:</b> Compare the three formulas for calculating cost of equity and determine why they are different and which one best represents the company's actual cost of equity.</p>
Weighted Average Cost of Capital	<p><b>Knowledge:</b> find specific company information (weights of debt and equity)</p> <p><b>Comprehension:</b> Determine which numbers from previous exercises are relevant to finding the weighted average cost of capital</p> <p><b>Application:</b> Use the information in a textbook formula</p>
Multiples Valuation	<p><b>Knowledge:</b> Find information concerning price and earnings for a company and P/E multiple for competitors firms</p> <p><b>Application:</b> Use this information and textbook equations to calculate P/E multiples for a firm and to calculate a price for a company using multiples valuation</p> <p><b>Analysis:</b> Determine whether a company is over or under valued, using multiples analysis</p>
Calculating Common Size Statements	<p><b>Comprehension:</b> taking financial statement information and turning each item into a percent of sales</p> <p><b>Analysis:</b> determining which, if any of the past numbers, are likely to be representative of the future</p>
Forecasting Free Cash Flows	<p><b>Comprehension:</b> using information from previous exercises, create a forecast of free cash flows for a firm, additional practice in using excel functions</p>
Valuing a Firm using Discounted Cash Flow and Multiples Valuation	<p><b>Application:</b> use techniques and information from previous exercises (regression, creating common size statement, multiples valuation) to value a company</p> <p><b>Synthesis:</b> Bring together information from this and previous exercises to write a comprehensive report</p> <p><b>Evaluation:</b> make a judgment about the accuracy of the valuation and perform a sensitivity analysis to calculate a range of possible values</p>
Financial Statement Analysis	<p><b>Knowledge:</b> Find industry data</p> <p><b>Comprehension:</b> Understand what numbers from a company's financial statements are needed to compute textbook ratios</p> <p><b>Application:</b> Use data to compute financial ratios</p> <p><b>Synthesis:</b> Use computed ratios to write a ratio analysis report of a firm, comparing the firm to itself and to its competitors</p> <p><b>Evaluation:</b> Determine why a firm has improved or declined over time and whether its performance is better than or worse than the industry average, and why.</p>

## *Introduction to the Financial Markets Lab*

Find five companies whose name begins with the first letter of your last name. Write down this list of 5 companies – you'll be using it in future classes. Choose one of these companies. Find this company's most recent 10K report (SEC's Edgar web site, investor relations section of the company's web site.) The 10K is a report that public companies are required to file annually. It tells about the company's operations and finances in great deal and includes the firm's most recent financial statements. Find the most recent financial statements – balance sheet, income statement and cash flow statement for this company using Research Insights. Submit a list of your five companies to Blackboard/Assignments as your deliverable for this class. For all classes, including this one, bring a notebook to write down your findings. For example, this class will give you at least one source for downloading financial statements. Write down that source, so you can go to this again if you want to download financial statements from a different company.

**Goals of the exercise:** Introduce students to the hardware and software in the Financial Markets Laboratory; Give students a list of companies and their financial statements that they can use for future exercises.

## *Introduction to a Company*

Pick one of the companies identified in a previous class.

**1. Get to know this company by finding the following information. When you have a good source of information, on market price, dividends, etc., please share this information with the class. It is a good idea to record these sources in your notebook for your future reference.**

- What is the current market price?
- What is the dividend per share for the most recent fiscal year? Please share dividend information sources as well. Note that many sites have dividend information. Often the best site is your company's web site, investor relations section.
- Number of shares outstanding?
- What exchange is the stock traded on?

**2. Find the following information on the firm's latest financial statement from its most recent 10K report:**

- Earnings before interest and taxes (EBIT) from the income statement
- Total assets from the balance sheet

**3. Go to management's discussion of risk in your company's 10K report. Pick two areas that the firm's management is worried about and identify as significant risk factors for your company.**

- Find an article in which the business press or an analyst (any party except the company itself) talks about the risk factors that you have chosen. This exercise will introduce you to how to search VBIC databases – in particular, you will learn how to develop a search strategy using Boolean connectors AND/OR to find articles and information that will help analyze financial statements. (Business Source Complete) What is (are) the risk factor(s) you identified? Cite the article(s) you found concerning your company and this risk factor, using proper citation format (see VBIC for information on proper format).

Your deliverable for the day is a report with the names of the partners who worked on the project, name of your company (whose first letter must be the first letter of one of your last names), and answers to the questions above.

**Goals of this exercise:** Familiarize students with the information that is contained in company report, learn how to search data bases that contain current articles about companies, identify and summarize risks faced by a specific company and recognize business press articles about these specific risks.

### *Economic and Industry Analysis*

Pick one of your companies.

- What industries does your company operate in? (Hoovers)
- What is the primary industry that your company is in? What is the industry code?
- Download an industry ratio report for your company and its primary industry. What is one ratio that stands out as being very different for your company when compared to the industry?
- Choose several economic variables that you believe are relevant to your company's performance. Variables could include gross domestic product, industrial production, personal income, retail sales, consumer prices, unemployment, housing starts, exchange rates or interest rates. Find the latest numbers and trends in these statistics. Explain why they are relevant to your company and what impact they **could** have on your company's future performance and stock price.
- Where in the business cycle are we – recession? Economic expansion? What impact does this have on your company?
- Compare your company's industry to one other industry. Is your industry performing better or worse than the other industry? What are some of the key issues, problems, opportunities and outlook for your company's industry?

This exercise is not a competition. When you have found an especially good source of information, let the class know. Each person working on the report must submit the report through blackboard to get credit. The deliverable is your answers to the questions in the bullet points above.

**Goals of this exercise:** Find sources of industry information, analyze the current economic condition and apply this information to a specific company, concluding with an analysis of how a specific company will perform within its industry. This exercise extends the risk analysis performed in the previous exercise, Introduction to a Company.

### *Seeking out buried information – EBITDA coverage ratio*

EBITDA coverage ratio calculates all the cash flow that is available for firms to pay their debt obligations. Creditors, those who lend the firm money, are very interested in whether or not the firm has enough cash to pay them back. EBITDA coverage is one measure of this and often of importance to creditors. Calculate the EBITDA coverage ratio for your company.



$$\text{EBITDA coverage ratio} = \frac{\text{EBITDA} + \text{Lease Payments}}{\text{Interest} + \text{Principal Payments} + \text{Lease Payments}}$$

First, find EBITDA. Go to the income statement and look for Earnings Before Income and Taxes. This might have a different name on your company's income statement, for example, operating profit. It is the income the firm earns BEFORE interest expense is subtracted (or interest income is added) and before taxes are paid. Then see if your company's statement has a separate line item for depreciation. (This will be below sales and above EBIT on the income statement.) If it does, then add the depreciation number to EBIT. This is EBITDA. If it does not have a separate line item, then go to the firm's cash flow statement. Look under operating cash flows for depreciation. Again, add this number to EBIT to get EBITDA. Find the other pieces of information that you need – interest expense is on the income statement. Principal payments are on the cash flow statement, in the financing activities section of this statement. Lease payments are harder to find. They do not appear on either the income statement or the cash flow statement. Go to the notes following the financial statements in your company's 10K report. Look for a note labeled "Leases". There may not be a separate note for Leases; this information might be included on the "Debt" note. This note should tell you what the lease payments are each year for the next 5 years. Choose the number for the most recent year and use this as "lease payments" that is needed for the EBITDA coverage ratio. You are now ready to calculate EBITDA coverage ratio. Your deliverable is your calculation of this ratio.

**Goals of this exercise:** be able to find specific numerical information in a company's financial statements and use this information to calculate a ratio, be able to scan a company's reports to find information that is only available by searching within a company's reports, know which of many statements has the information needed. This exercise is designed to pull together the students' knowledge of all of the firm's financial statements (income statement, cash flow statement, notes to the balance sheet) and put this information together to solve a numerical problem.

*Determining Relevant Numbers – Finding Economic Value Added and Market Value Added*

$$\text{EVA} = \text{EBIT}(1-T) - (\text{Amount of capital} \times \text{Cost of capital})$$

Earnings before interest and taxes (EBIT): from income statement

Tax rate (T): Taxes divided by earnings before taxes (from income statement)

Amount of capital: Total assets from balance sheet

Cost of capital – use WACC obtained from Bloomberg

$$\text{MVA} = \text{Market value of equity} - \text{book value of equity}$$

Market value of equity = number of shares outstanding x price per share (as of the date of your company's most recent annual report)

Book value of equity = total shareholders equity from the balance sheet

Your deliverable is finding the inputs and calculating EVA and MVA for your company. You should clearly label each input that went into the equation.

**Goals of this exercise:** Similar to the previous exercise, Calculating EBITDA Coverage Ratio, this exercise requires students to find information from the firm's financial statements and find

information about the company that is not contained in company reports and use all of this information to solve a numerical problem. It also acquaints students with an additional data base (Bloomberg) that they did not need in previous exercises.

### *Yield Curves*

Look at the current term structure of interest rates. (Search for “yield curve” or “term structure of interest rates” or “treasury yields” or “treasury interest rates.” Find the current treasury rates for 3,6 and 9 month Treasury bills, and for 5,10,20 and 30 year Treasury bonds. Plot time and yield on a graph in excel. What is the shape of the yield curve? What implications does this have for the economy?

**Goals of this exercise:** Find sources of information about Treasury yields and use this information to plot a graph in excel. Then, draw conclusions about what the graph says about the economy.

### *Lines of Credit*

Many firms use some amount of bank financing. Choose a company that uses bank financing. Go to the web site of GE Capital, a large commercial credit-granting firm, at <http://www.gecfosolutions.com/afp.html>. Go to GE Credit Line Calculator. Find information about your company needed by the calculator, such as sales, location, principal line of business. Assume that you want a \$500,000 line of credit. On the calculator, in the section “my inventory is tracked by”, first use Automated Perpetual System” and then “Physical Counts.” Do you get different results? Why could this occur?

**Goals of this exercise:** Apply company information to an online calculator to determine whether your company would qualify for bank credit, analyze the results of using differing inventory systems.

### *Calculating Sales Growth*

Download the 5 year historical income statement, balance sheet and cash flow statements for your company. Look at the revenues (or sales) for the most recent 5 years for your company. Look up the formula for calculated returns:

$$\left( \text{One year return for a stock} = \frac{\text{Stock price today} - \text{stock price one year ago}}{\text{Stock price one year ago}} \right)$$

How could this formula be used to calculate year over year sales growth?

$$\left( \text{Sales growth in year 1} = \frac{\text{Sales in year 2} - \text{Sales in year 1}}{\text{Sales in year 1}} \right)$$

Calculate the sales growth rate each year over the five year period and find an average sales growth rate. You will have 4 numbers to average. Look up what analysts believe is the future growth rate in sales, earnings or dividends for your company. Your deliverable is your calculations of sales growth and your estimates of future growth (with sources listed). Document where all the numbers come from.

**Goals of this exercise:** Provide students with an opportunity to use theory learned in class lectures using real world data, find sources of analyst estimates of sales and sales growth.

### *Understanding Risk*

Calculating risk. Download the stock prices for the past 5 years, using monthly data, for your company. Download index values for the S&P 500 for the same time period. Convert your price series into a return series by calculating  $\text{return}_t = (P_t - P_{t-1})/P_{t-1}$ . Calculate the mean (AVG), standard deviation (STDEV) and coefficient of variation of returns for your stock and of the S&P index using the data you have collected. You can use the functions of Excel to do this. Note that this is a monthly standard deviation.

Is your company more or less volatile than the S&P index? Speculate (one or two sentences) on why your company is more or less volatile than the index. For example, you might expect consumer goods companies to be less volatile and tech companies more volatile.

Your deliverable is your excel file with your information, answers to the above questions and calculations.

**Goals of this exercise:** Similar to the previous exercise, the goal is to take textbook formulas and apply them using real world data. This exercise extends the previous exercise, Calculating Sales Growth, by asking students to perform their calculations using excel rather than a calculator.

### *Stock Returns over Time*

Download stock prices and dividends per share (per year) for your company and for the S&P 500 index for the past 10 years. Using excel, graph the year end stock prices. Label any stock splits or stock dividends that occurred during this time period. Suppose you bought a share of the stock 10 years ago. Calculate the capital gain yield, dividend yield and total yield for your stock for each year. Plot your stock's annual total yields against the annual total yields for the S&P 500. Compute the geometric average rates of return for your stock and for the S&P 500. Show how much your wealth would have been if you invested \$100 in your stock 10 years ago versus investing \$100 in the S&P 500.

**Goals of this exercise:** Gain more practice in using excel chart wizard, applying textbook formulas using real world data.

### *Interpreting Beta*

Calculating beta. Download 5 years of monthly stock returns (not prices) for your company. Then download 5 years of index returns exactly matching the five years of returns for your company's stock. Calculate beta by regressing your stock's returns on the returns to your index. Look up 3 other estimates of beta (and share this information with the rest of the class). Compare your calculated beta to the betas that you look up. In two or three sentences, state whether your calculated beta is higher or lower than betas you looked up. Is there a wide or narrow range of betas? Why do you think this might be?

Interpreting beta. Look at the statistical results page of your regression analysis. In the regression analysis, note that the intercept of the regression line is a measure of your company's

performance. First, look up the one year Treasury bill rate (posted on blackboard). Choose the most recent 5 years of data. (Note dates may not correspond exactly to your regression dates, and this is fine.) Average these numbers and then divide by 12 to get the monthly rate. Then solve for: Intercept -  $r_{rf}(1-\beta)$ . Use the intercept from your regression, and beta from your regression and the risk free rate that you just calculated. This is a measure of how much better (or worse) your company has performed relative to the market, as measured by the S&P 500. For example, suppose  $\beta= 1.2$ , the y axis intercept is  $-0.01\%$  and the 1 year treasury bill rate is  $4.3\%$ , making the monthly rate  $4.3\%/12 = 0.36\%$ . Intercept -  $r_{rf}(1-\beta) = -0.01\% - [(0.36\%)(1-1.2)] = -0.01+0.072 = +0.062\%$ . This company performed .062% better than expected, given its risk level. The  $R^2$  of the regression tells you how much of the variance in your company comes from market sources, like interest rate risk, inflation risk, etc. Suppose your regression has an  $R^2$  of 35%. This says 35% of the company's risk comes from market sources and the remaining 65% comes from firm specific components. This risk is diversifiable and is not rewarded in the CAPM. Does your company have a lot or little of market risk and firm specific risk? Why or why not?

Your deliverable to be uploaded to blackboard is your regression results and your brief, written answers to the questions in this assignment.

**Goals of this exercise:** Understand the mechanics of running a regression analysis, interpreting the statistics generated in a regression analysis, use those statistics to draw conclusions about a company.

### *Bonds*

Choose a company that has outstanding bonds. What outstanding debt securities does your company have? Choose one outstanding bond issue. What are the maturity and issue dates, frequency (annual or semi annual), coupon rate, principal amount outstanding, bond rating, call price, current market price, yield to maturity, and current yield of this issue? Find the yield for bonds of this rating and maturity. This is the interest rate that you will use in the bond price calculation. Given this information, calculate the price of your bond issue. Is your calculated price higher or lower than the traded price for this issue? Why could your calculated value be different from the bond's actual value?

**Goals of this exercise:** Find information about bonds, use the textbook formula to calculate the price of a bond and speculate about why the calculated price is different from the bond's actual price.

### *Cost of Equity – Capital Asset Pricing Model and Bond Yield Plus Risk Premium Model*

Use the beta that you found in a previous exercise. Find the current 10 year Treasury bond rate. Assume that the market risk premium is 6%. (Textbook states that the average is 4-8%.) What is your company's cost of equity using the capital asset pricing model?

Calculating cost of equity using bond yield plus risk premium. Estimate your company's cost of equity,  $r_s$ , using the bond yield plus risk premium approach. Look at your original list of five companies. Choose a company that has some debt in its capital structure. If none of your

companies have debt, see your TA and you will be assigned a company with debt for this exercise. You can get bond yield from Reuters or you also can go to the Mergent data base and see if your company has bonds and then look at the average yield of these bonds. Another good source is <http://exa.marketwatch.com/finra/MarketData/CompanyInfo/default.aspx>. You can also calculate an approximate cost of debt as interest expense divided by interest-bearing debt. Interest expense is on the income statement and interest bearing debt (long term debt, current portion of long term debt, notes payable) is on the balance sheet.

Your deliverable is your cost of equity equations and calculated answers, calculated using both methods – with every input referenced. You will not get credit if you submit just the answer - you must submit the equation, the inputs to the equations and where you found those inputs.

**Goals of this exercise:** take the information from the previous exercise on interpreting beta and use the capital asset pricing model to calculate the cost of equity for a company. Find sources of bond yields for a company and calculate its cost of equity using the bond yield plus risk premium formula.

#### *Cost of Equity – Dividend Growth Model*

Calculating cost of equity using dividend growth model. Choose one of your 5 companies that pays a regular dividend. Estimate  $r_s$  using the discounted cash flow model,  $(D_1/P_0) + g$ . Find an analyst's estimate of dividend growth (preferred) or earnings growth if dividend growth is not available. Again, share your sources with the class. Find the dividend paid in the last fiscal year – a good source for this is your company's web site. Find the current stock price for your company. What is the cost of equity using this model? Note that this model uses the longest possible estimate of  $g$ . Ideally, you want an infinite forecast, but no one makes these, so you will generally settle for a 5 or 10 year forecast of growth. What has been the average rate of growth in dividends for your company's stock for the past 10 years? The past 5 years? (Dividends paid should be on your company's cash flow statement. In addition, there are web sites where you can look up past dividend growth. Has this growth rate increased, decreased or remained about the same over time?

Compare the cost of equity calculated using the dividend growth model with the cost of equity calculated in the previous exercise (Cost of Equity – Capital Asset Pricing Model and Bond Yield Plus Risk Premium Model). Are they different? Why do think the differences occur? Which model most accurately calculates cost of equity for your company? Why do you think this is?

**Goals of this exercise:** Find dividend, price and growth rate information for a company to calculate cost of equity. Draw conclusions about the impact of the choice of growth rate on the final answer. Compare the cost of equity found in this exercise with the cost of equity found in previous exercises and speculate about the differences in answers.

#### *Weighted Average Cost of Capital*

Find the weighted average cost of capital for your company.

Cost of capital: Weight of debt x cost of debt x (1-T) + weight of equity x cost of equity

- a. Cost of equity – average the three methods of finding cost of equity from previous classes.
- b. Cost of debt – This is your company's bond yield.

Weights of debt and equity. Weight of debt is amount of debt (B/S) divided by debt + equity and weight of equity is amount of equity (B/S) divided by debt + equity.

**Goals of this exercise:** Take information from previous exercises and put it together in the weighted average cost of capital formula.

### *Multiples Valuation*

Price/Earnings Ratio. What is the P/E ratio for your company? Compute a P/E ratio based on the earnings in your company's most recent 10K and 10Q statements. What is the published P/E for your company? Does this differ from what you computed? Why? What is the P/E multiple for 3 competitors of your company? Is your company's P/E higher or lower than the competitors or an average of the competitors? On the basis of P/E ratios, is your company fairly priced, cheap or expensive?

**Goals of this exercise:** Find sources of P/E multiples and compute P/E multiples for a company and its competitors. Apply textbook formulas for multiples valuation and determine the price for your company.

### *Calculating Common Size Financial Statements*

Download 5 year income statements and balance sheets for your company. Turn the five years of balance sheet and income statement data into common size statements, with all items a percent of sales. Find the average of each of the items on your statements, again, as a percent of sales. Is the average representative of that line item? In other words, have the line items as a percent of sales remained steady over the five year period? Or, is there a trend up or down in the line items? What number is likely to be representative of the future for each of the line items on your company's income statement and balance sheet – an average, the most recent percent, a past percent?

**Goals of this exercise:** Manipulating financial statements to create common size statements, determine whether an average, or most recent or past numbers are most representative of the future.

### *Forecasting Free Cash Flows*

Take the sales growth numbers for your company found in a previous exercise (Calculating Sales Growth). Most free cash flow components are tied to sales growth. For example, a positive sales growth suggests a positive growth in cost of goods sold, assets, liabilities, etc. You may want to average your sales growth numbers to serve as the base case growth rate for your forecast. Look at the average percentages of sales that you calculated in a previous exercise (Creating Common Size Statements). Assume that each component on the income statement and

balance sheet increase in the future at this average percent of sales. And, assume that sales will grow at the average of your regression results and the sales growth rate that you looked up.

Using Excel, forecast pro forma free cash flows for a period of 10 years, assuming your average sales growth rate will be the future growth rate for the next 10 years. Use only relevant cash flows, as detailed in the textbook. You probably will not want to forecast everything on your company's income statement. For example, you can ignore extraordinary items. Note that financing cash flows, like interest expense, should not be included.

**Goals of this exercise:** Use excel to create free cash flows. This exercise is very cumulative, relying on results of previous exercises

### *Valuing a Firm Using Discounted Cash flow and Multiples Valuation*

Start with your forecast of free cash flows from the previous exercise. Assume that after 10 years, your company will grow at the current 30 Treasury bond rate plus 2%. Discount your terminal value and the intermediate cash flows to find the enterprise value for your company. WACC is the appropriate discount rate. You can use a WACC calculated in a previous exercise.

Find your calculated share price, as of the date of your company's most recent annual report. You should subtract the value of each non-common equity claim from the estimate of firm value:

$$\text{Share price} = \frac{\text{Firm Value} - \text{debt} - \text{preferred stock}}{\text{Number of shares outstanding}}$$

Look up the share price as of the date of your company's annual report. Is your price higher or lower than the actual price? Your analysis is most sensitive to the growth rate in sales. What is the range of growth rates you looked up in a previous exercise? Calculate future sales using regression, regressing past revenues and time. Re-run your forecasted cash flows in excel with your lowest and highest growth rates and see what your company value is. You should use actual sales growth numbers in your project. In other words, suppose your average future sales growth forecast (average of historical, regression and analyst estimates) is 8% per year for the next 5 years. This can be your base case sales growth rate. Suppose you found that your company grew at 3% in the past and one analyst thinks your company will grow at 14% in the future. Use the 3% as your low growth rate estimate and 14% as high growth – in other words, use actual growth rates to create a range of sales growth rates; don't arbitrarily add or subtract from the average growth rate. Write about your results when you used high, low or average growth rates in your basic excel free cash flows. Is your answer closest to the current, actual stock price when you use a high or low growth rate? Why do you think this is?

Find P/E, Price to Sales and Price to Cash Flow ratios for at least 4 competitors of your company. Using each ratio individually and then as an average, find the stock price for your company. How does this compare to your company's current stock price? Why do you think the comparables analysis has under or overvalued or exactly valued your company? Which companies are the most comparable to your company? Which multiple provides the most accurate (closest to the actual) stock price for your company. Use the equations,  $P = P/E \times \text{EPS}$ ,  $P = P/\text{Sales} \times \text{Sales}$  and  $P = P/\text{Cash Flow} \times \text{Cash Flow}$ . You do not need to calculate multiples for the comparable companies – many web sites will provide you with P/E, P/Cash Flow and

P/Sales for the competitors of your company. If you don't have 4 companies, you can use industry average and/or industry median.

What is the value of your company using discounted cash flow and multiples? Which is most accurate? Write a report summarizing your findings and conclusions.

**Goals of this exercise:** Extend previous exercises, using many of the same techniques applied to different numbers, perform a comprehensive company valuation.

### *Financial Statement Analysis*

Calculate all of the textbook ratios for your company for at least a two year period. Find the industry average or median for as many of these ratios. What has happened to your company in the past two years. Have ratios declined or gotten better? Which ones have improved and which have declined? Why do you think this has happened? How does your company compare to the industry averages? Why do you think your firm is performing above or below the industry? Write a report summarizing your conclusions.

**Goals of this exercise:** Calculate textbook ratios using real world data, find industry data and use this information to perform a financial statement analysis of your firm.



## Exhibit 1 Bloom's Taxonomy

1. Knowledge
  - a. Knowledge of specifics
    - i. Knowledge of terminology
    - ii. Knowledge of specific facts
  - b. Knowledge of ways and means of dealing with specifics
    - i. Knowledge of conventions
    - ii. Knowledge of trends and sequences
    - iii. Knowledge of classifications and categories
    - iv. Knowledge of criteria
    - v. Knowledge of methodology
  - c. Knowledge of universals and abstractions in a field
    - i. Knowledge of principles and generalizations
    - ii. Knowledge of theories and structures
2. Comprehension
  - a. Translation
  - b. Interpretation
  - c. Extrapolation
3. Application
4. Analysis
  - a. Analysis of elements
  - b. Analysis of relationships
  - c. Analysis of organizational principles
5. Synthesis
  - a. Production of a unique communication
  - b. Production of a plan, or proposed set of operations
  - c. Derivation of a set of abstract relations
6. Evaluation
  - a. Evaluation in terms of internal evidence
  - b. Evaluation in terms of external criteria

## Exhibit 2 Examples of Bloom categories

### Knowledge - Defining terms/Recalling data/Identifying issues

1. Knowledge of specifics
  - a. Knowledge of terminology – what is the definition of beta?
  - b. Knowledge of specific facts – what are the components of weighted average cost of capital?
2. Knowledge of ways and means of dealing with specifics
  - a. Knowledge of conventions – Most beta regressions are performed using 5 years of historical, monthly data
  - b. Knowledge of trends and sequences – A firm's working capital needs usually increase with sales
  - c. Knowledge of classifications and categories – Price/earnings is a market value measure of a firm's performance
  - d. Knowledge of criteria – Black/Scholes option pricing model uses a risk free rate that matches the time period of the option being valued.
  - e. Knowledge of methodology – Beta can be calculated using regression analysis
3. Knowledge of universals and abstractions in a field
  - a. Knowledge of principles and generalizations – the price of a bond is inversely related to the interest rate
  - b. Knowledge of theories and structures – Capital Asset Pricing Model relates an asset's risk to its required return.

### Comprehension

1. Translation (for example, moving from symbolic to another form) – verbally explaining the components of the weighted average cost of capital equation
2. Interpretation- Interpreting the regression statistics resulting from a beta calculation
3. Extrapolation – Drawing a conclusion about the market vs. unique risk of a firm, based on the beta regression analysis

### Application – Choosing the appropriate model to calculate the cost of equity

### Analysis

1. Analysis of elements – Determining which balance sheet and income statement items are used, and how they are used, when calculating the weighted average cost of capital
2. Analysis of relationships – Explaining why cash flow increases but net income decreases if depreciation expense increases
3. Analysis of organizational principles – Understanding why maximizing shareholder's wealth is a primary goal of financial managers

### Synthesis

1. Production of a unique communication – turning multiple analyses into a coherent, connected report
2. Production of a plan, or proposed set of operations – forecasting future cash flows, based on current financial statements
3. Derivation of a set of abstract relations – using financial information to develop a theory about future stock behavior

#### Evaluation

1. Evaluation in terms of internal evidence – determining whether a stock should be a buy, sell or hold based on its fundamentals
2. Evaluation in terms of external criteria – determining whether company should be purchased, based on a comparables valuation

## Exhibit 3 St. Edward's University Center for Teaching Excellence Task-Oriented Question Construction Wheel

### Knowledge – Information Gathering

Verbs: define, describe, draw, identify, label, locate, memorize, name, recite, recognize, select, state, write

Activities: a definition, a dictionary, events, films, magazine articles, newspapers, people, ratio, recordings, television shows, text reading, video

### Comprehension

#### 1. Confirming Information Gathering

Verbs: change, confirm, express, illustrate, match, paraphrase, restate, transform

Activities: analogy, causal relationships, conclusion or implication based on data, outline, summary

#### 2. Confirming Use of Knowledge

Verbs: extend, distinguish, compare, infer, relate, summarize, generalize, predict, defend, explain

Activities: cartoon, collage, diagram, drama, graph, photograph, poster, skit, speech, story, own statement, tape recording

### Application – Making Use of Knowledge

Verbs: apply, change, choose, classify, collect, discover, dramatize, draw, interpret, make, model, modify, paint, prepare, produce, report, show

Activities: Creating a cartoon, a drama, a filmstrip, a forecast, a list, a map, a meeting, a mobile, a painting, a paper which follows an outline, a project, a puzzle, a question, diagram, illustration, photograph, sculpture, solution, shifting smoothly from one gear into another

### Analysis – Taking Apart

Verbs: analyze, compare, categorize, classify, construct, contrast, differentiate, distinguish, examine, infer, investigate, point out, research, select, separate, subdivide, survey, take apart

Activities: break down an argument, draw a conclusion, graph, identify parts of a propaganda statement, model, questionnaire, report, survey, syllogism

### Synthesis – Putting Together

Verbs: add to, develop, originate, combine, construct, create, design, formulate, hypothesize, invent, organize, plan, produce, role-play, what if

Activities: a play, article, book, cartoon, game, invention, poem, report, song, story, formulate a hypothesis or question, set of rules, principles or standards, speculate on or plan an alternate course of action

### Evaluation – Judging the Outcome

Verbs: apprise, assess, compare, consider, criticize, critique, judge, recommend, relate, solve, summarize, weigh

Activities: comparison of standards, conclusion, court trial, editorial, establishment of standards, evaluation, group discussion, recommendation, self-evaluation, survey, valuing

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