



## Understanding Beta (A)

“I don’t understand it! Yahoo has been such a winner, why has it collapsed so much?” bellowed Frank in the next cubicle. Sarah had endured Frank’s gloating over the success of his stock the year before last, but she suppressed a slight chuckle and decided to show him some pity. She felt she had to, since her two-stock portfolio had thrived over this past year, compared to the over 86% drop in value Frank’s had seen.

It all started two years ago, at the end of 1998. Frank was the kind of guy who was always talking about the latest “hot stock tip” he had heard about from a friend of a friend. Sarah, on the other hand, preferred a more conservative approach—the old “slow and steady wins the race” mantra. And, while she can’t remember exactly how it happened, they ended up in a friendly argument over their contrasting styles.

“Well, we’ll just see who’s right at the end of next year,” huffed Frank, as he turned to leave.

“Let’s make it three,” replied Sarah, who always preferred to look at the bigger picture.

“Fine by me...I’ll just win by three times as much,” muttered Frank, as he left for his holiday vacation.

During the first year, it looked as if Frank might make good on his prediction. His stock pick of Yahoo (NASDAQ: YHOO) had more than trebled. Sarah’s picks of IBM (NYSE:IBM) and Exelon Corp. (NYSE: EXC), which she purchased in equal weights, had lagged the surging market. It seemed as though every day Frank would drop some snide remark about his prowess as a financial guru.

But it all changed in 2000, when the market reached and then pulled back from its all time highs. Suddenly, the gloating stopped, and Sarah found her portfolio doing well, despite the downturn. IBM had mostly returned to about its starting value, while Exelon had taken off like a rocket. Curious about what forces might have caused such a reaction, Sarah decided to ask her friend Chance, a recent MBA from a Pennsylvania university, about the contest.

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*This note was prepared as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.*

“First off, one year, or even three years, is way too short a time frame to compare stock strategies...anything can happen,” began Chance. “But one way you can compare your strategies is to look at the stocks’ betas.”

### **“What’s a beta?”**

“Well, the short answer is that it represents the expected relative change in a stock given a change in the overall market. That is, for every one percentage point increase in the S&P 500, a stock with a beta of 1.0 should increase by about one percent, a stock with a beta of 2.0 should increase by two percent, and so on. This means that a stock’s beta is a measure of the company’s exposure to systematic risk; you see, each company really has two types of risk affecting its future income: systematic, or market, risk and unsystematic, or company specific, risk. Examples of unsystematic risk are things like the CEO announcing early retirement or a plant fire, while systematic risks include economic downturns and inflation. If you invest in many stocks, you expect the unsystematic risks to balance each other out over the long run, but the systematic risks are always going to be there, and beta tells you how much a stock is expected to be affected by them relative to the rest of the market.”

### **“How do I calculate a firm’s beta?”**

“There are many different methods used by different information services, but the general idea is to take the historical changes in the stock market over a given period and compare them to the historical changes in the given stock. By running a simple linear regression, you should get an approximation of the firm’s beta. The output of the regression should also give you the  $R^2$ , which is the correlation or, essentially, the amount of variation in the stock price explained by variations in the market, i.e. the systematic risk. Additionally, your output should show you the residuals, which should be clustered around zero if the beta is an unbiased estimate.”

### **The download procedure for the data is as follows:**

1. Go to <http://finance.yahoo.com>.
2. Enter symbol into search box (e.g. S&P 500 is "^SPX").
3. Click on "historical prices" on the left.
4. Select "monthly" and the date range (grab from May 1984 to present, or since IPO in the case of Yahoo) and click "Get Prices".
5. Near the bottom of the page, click "Download to Spreadsheet".
6. Use the data in the “Adj. Close” column to calculate the percentage change from month to month.

### **Questions**

1. What are the betas of Yahoo, IBM, and Exelon Corp.? What percentage of the variation of each of the companies is explained by fluctuations in the market?
2. What might explain why the betas of these companies are what they are? That is, why is Exelon’s so much different than Yahoo’s?

3. Why use the adjusted close column? What types of events must be corrected for in the stock price to get an accurate representation of the change in market valuation from month to month?
4. Could a stock have a negative beta? What would that mean?
5. Which strategy do you think will be the winning strategy over the three year period (remember, it is currently January 2001 and the contest will run for one more year)?
6. If you run the regression on EXC only using data after 1996, the P-value is quite large. Does this mean this method for calculating betas fails during this time frame?

Advanced question:

7. How has it helped Sarah to invest in two stocks instead of only one? Think in terms of what this might do to the total unsystematic risk exposure of her portfolio.