

Problems for Lecture 7

Group #2 of Cohort #2

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1. Security B has a price of \$35 and a beta of 1.4. The risk-free rate is 5% and the market risk premium is 6%.
 - (a) According to the CAPM, what return do investors expect on the security?
 - (b) Investors expect the security not to pay any dividend next year. At what price do investors expect the security to trade next year?
 - (c) At what price do investors expect the security to trade next year, if the expected dividend next year is \$2 instead of zero?

Solution:

According to CAPM, the expected return on security B can be calculated as

$$E(R_n) = R_f + \beta_n (E(R_M) - R_f) = 5\% + 1.4 \times 6\% = 13.4\%$$

The stock return with dividend can be written as

$$R_n = \frac{(P_1 - P_0) + D}{P_0}$$

Without dividend, the expected price of security for next year can be computed as

$$P_1 = R_n P_0 + P_0 = 1.4 \times 35 + 35 = 39.69$$

With dividend, the security price becomes

$$P_1 = (1 + R_n) P_0 - D = 1.4 \times 35 + 35 - 2 = 37.69$$

2. Consider the following table, which gives a security analyst's expected return on two stocks for two particular market returns:

Market Return	Aggressive Stock	Defensive Stock
5%	2%	3.5%
20%	32%	14%

- What are the betas of the two stocks?
- What is the expected rate of return on each stock if the market return is equally likely to be 5% or 20%?
- If the T-bill rate is 8% and the market return is equally likely to be 5% or 20%, draw the SML for this economy.
- Plot the two securities on the SML graph. What are the alphas of each?

Solution:

The betas of the two stocks can be computed as

$$\beta_A = \frac{32\% - 2\%}{20\% - 5\%} = 2$$

$$\beta_D = \frac{14\% - 3.5\%}{20\% - 5\%} = 0.7$$

If the market return is equally likely to be 5% or 20%, the expected return of each stock can be computed as

$$E(R_n)_A = 0.5 \times (2\% + 32\%) = 17\%$$

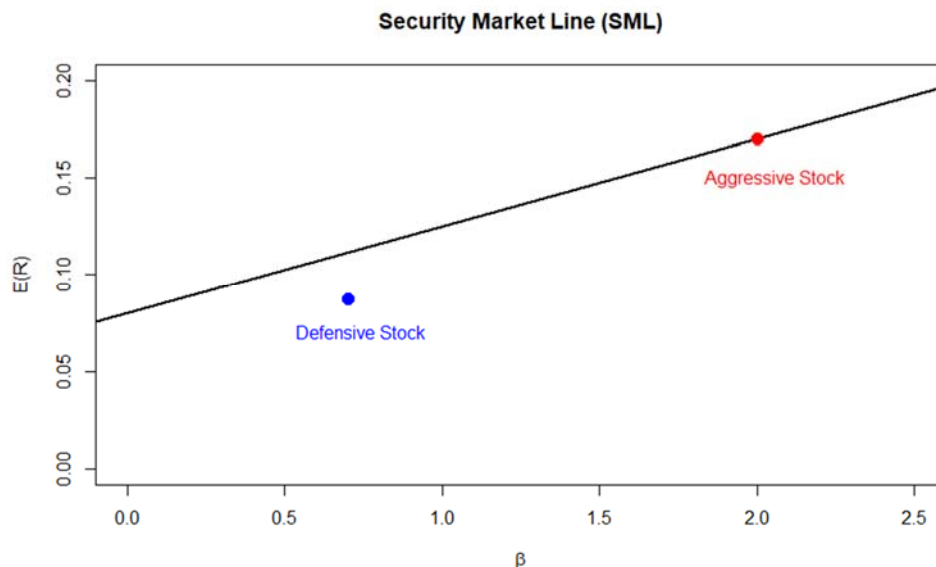
$$E(R_n)_D = 0.5 \times (3.5\% + 14\%) = 8.75\%$$

The market return is equally likely to be 5% or 20%, the expected market return can be calculated as

$$E(R_M) = 0.5 \times (5\% + 20\%) = 12.5\%$$

The SML can be drawn between the two points

$$(0, R_f = 8\%) \rightarrow (E(R_M) = 12.5\%, \beta(R_M) = 1)$$

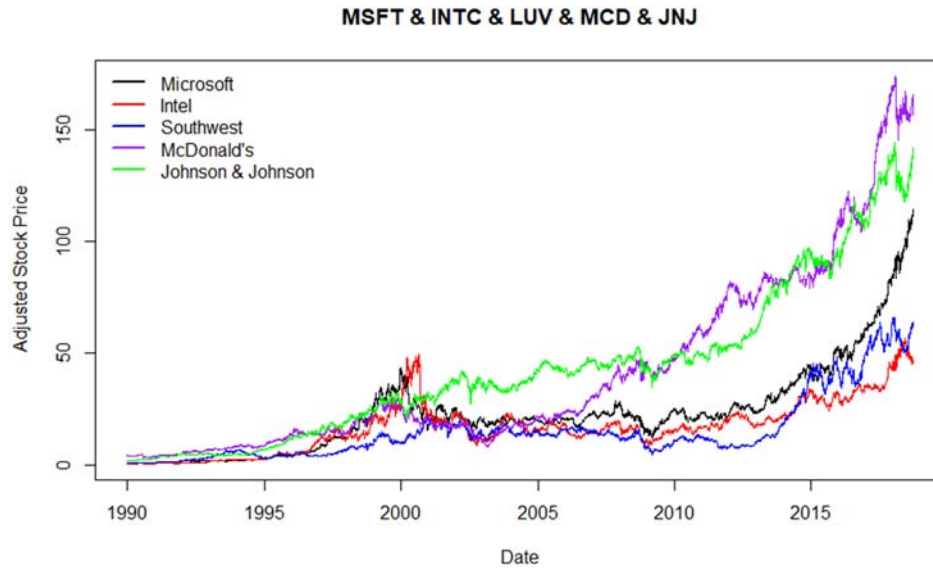


By plotting the two securities on the SML graph, the alphas for the two securities can be computed as

$$\alpha_A = 0.0, \alpha_D = -0.024$$

3. In this problem you will use the returns in the file `lecture8p.xlsx`, to compute betas and alphas for all five companies (Microsoft, Intel, Southwest, McDonald's, and Johnson & Johnson).
 - (a) Regress excess stock returns on excess market returns to obtain estimates of the betas of the five stocks. What is the standard deviation of these estimates?
 - (b) What are the estimates of the alphas, and the standard deviation of these estimates? What are the estimates of the standard deviation of idiosyncratic risk?
 - (c) According to the CAPM, which stock should have the highest expected return? Which stock should have the lowest expected return? Estimating expected returns from sample averages, check whether these CAPM predictions are supported by the data.

Solution:



	β_n	$\sigma(\beta_n)$
MSFT	1.1418	0.0168
INTC	1.3315	0.0201
LUV	1.0073	0.0215
MCD	0.6239	0.0144
JNJ	0.5976	0.0125

	α_n (BP per day)	$\sigma(\alpha_n)$ (BP)
MSFT	4.77	1.848
INTC	3.384	2.212
LUV	4.133	2.359
MCD	3.027	1.583
JNJ	3.653	1.379

	ε_n
MSFT	0.01572
INTC	0.01882
LUV	0.02007
MCD	0.01347
JNJ	0.01173

According to CAPM, the expected return of an asset only depends on risk through beta

$$E(R_n) = R_f + \beta_n (E(R_M) - R_f)$$

The larger beta is, the higher expected return of the asset.

	β_n	Annual Return
INTC	1.3315	21.67%
MSFT	1.1418	23.71%
LUV	1.0073	20.48%
MCD	0.6239	15.21%
JNJ	0.5976	16.76%