

Essentials of Investments (BKM 7th Ed.)
Answers to Selected Problems – Lecture 3

Note: The solutions to Example 6.4 and the concept checks are provided in the text.

Chapter 6:

- 19.
- a. The risk of the diversified portfolio consists primarily of systematic risk. Beta measures systematic risk, which is the slope of the security characteristic line (SCL). The two figures depict the stocks' SCLs. Stock B's SCL is steeper, and hence Stock B's systematic risk is greater. The slope of the SCL, and hence the systematic risk, of Stock A is lower. Thus, for this investor, stock B is the riskiest.
 - b. The undiversified investor is exposed to both systematic and firm-specific risk. Stock A has higher total risk because the total variation of the observations around the SCL is larger for Stock A than for Stock B. Stock A is therefore riskiest to this investor.
25. In the regression of the excess return of Stock ABC on the market, the square of the correlation coefficient is 0.296 (this is the R^2 of the regression). This indicates that 29.6% of the variance of the excess return of ABC is explained by the market (systematic risk).

Chapter 7:

3. $E(R_p) = R_f + \beta_p[E(R_M) - R_f]$
 $0.20 = 0.05 + \beta(0.15 - 0.05)$
 $\beta = 0.15/0.10 = 1.5$
6. a) False: $\beta=0$ implies $E(R)=R_f$, not zero.
b) False: Investors of a diversified portfolio require a risk premium for systematic risk. Only the systematic portion of total risk is compensated.
c) False: 75% of the portfolio should be in the market and 25% in T-bills.
 $\beta_p=(0.75 * 1) + (0.25 * 0) = 0.75$
8. Not possible. Portfolio A has a higher beta than B, but a lower expected return.
9. Possible. If the CAPM is valid, the expected rate of return compensates only for market risk (beta), rather than for nonsystematic risk. Part of A's risk may be nonsystematic.
10. Not possible. If the CAPM is valid, the market portfolio is the most efficient and a higher reward-to-variability ratio than any other security. In other words, the CML must be better than the CAL for any other security. Here, the slope of the CAL for A is 0.5 while the slope of the CML is 0.33.
11. Not possible. Portfolio A clearly dominates the market portfolio with a lower standard deviation and a higher expected return. The CML must be better than the CAL for security A.
12. Not possible. Security A has an expected return of 22% based on CAPM and an actual return of 16%. Security A is below the SML and is therefore overpriced. It is also clear that security A has a

higher beta than the market, but a lower return which is not consistent with CAPM.

13. Not possible. Security A has an expected return of 17.2% and an actual return of 16%. Security A is below the SML and is therefore overpriced.
14. Possible. Portfolio A has a lower expected return and lower standard deviation than the market and thus plots below the CML.
18. Using the SML: $6 = 8 + \beta(18 - 8)$

$$\beta = -2/10 = -.2$$

23. The expected return of portfolio F equals the risk-free rate since its beta equals 0. Portfolio A's ratio of risk premium to beta is: $(10-4)/1 = 6.0\%$. You can think of this as the slope of the pricing line for Security A. Portfolio E's ratio of risk premium to beta is: $(9-4)/(2/3) = 7.5\%$, suggesting that Portfolio E is not on the same pricing line as security A. In other words, there is an arbitrage opportunity here.

For example, if you created a new portfolio by investing 1/3 in the risk-free security and 2/3 in security A, you would have a portfolio with a beta of 2/3 and an expected return equal to $(1/3)*4\% + (2/3)*10\% = 8\%$. Since this new portfolio has the same beta as security E (2/3) but a lower expected return (8% vs. 9%) there is clearly an arbitrage opportunity.

27. The APT factors must correlate with major sources of uncertainty in the economy. These factors would correlate with unexpected changes in consumption and investment opportunities. DNP, the rate of inflation, and interest rates are candidates for factors that can be expected to determine risk premia. Industrial production varies with the business cycle, and thus is a candidate for a factor that is correlated with uncertainties related to investment opportunities in the economy.
28. A revised estimate of the rate of return on this stock would be the old estimate plus the sum of the expected changes in the factors multiplied by the sensitivity coefficients to each factor:

$$\text{revised } R_i = 14\% + 1.0(1\%) + 0.4(1\%) = 15.4\%$$

29. $E(R_p) = r_f + \beta_{P1}[E(R_1) - R_f] + \beta_{P2}[E(R_2) - R_f]$

Use each security's sensitivity to the factors to solve for the risk premia on the factors:

$$\text{Portfolio A: } 40\% = 7\% + 1.8\gamma_1 + 2.1\gamma_2$$

$$\text{Portfolio B: } 10\% = 7\% + 2.0\gamma_1 + (-0.5)\gamma_2$$

Solving these two equations simultaneously gives $\gamma_1 = 4.47$ and $\gamma_2 = 11.88$.

This gives the following expected return beta relationship for the economy:

$$E(R_p) = 0.07 + 4.47\beta_{P1} + 11.88\beta_{P2}$$

33. d. The expected return on the market.
34. d. You need to know the risk-free rate. For example, if we assume a risk-free rate of 4%, then the alpha of security R is 2.0% and it lies above the SML. If we assume a risk-free rate of 8%, then the alpha of security R is zero and it lies on the SML.