Key Concepts and Skills

• Know how to calculate expected returns
• Understand the impact of diversification
• Understand the systematic risk principle
• Understand the security market line
• Understand the risk-return trade-off

Expected Returns

• Expected returns are based on the probabilities of possible outcomes
• In this context, “expected” means “average” if the process is repeated many times
• The “expected” return does not even have to be a possible return

\[ E(R) = \sum_{i=1}^{n} p_i R_i \]
Example: Expected Returns

- Suppose you have predicted the following returns for stocks C and T in three possible states of nature. What are the expected returns?
  - State          Probability  C   T
  - Boom           0.3   0.15  0.25
  - Normal         0.5   0.10  0.20
  - Recession      ???   0.02  0.01
- \( R_C = 0.3(0.15) + 0.5(0.10) + 0.2(0.02) = 0.099 = 9.9\% \)
- \( R_T = 0.3(0.25) + 0.5(0.20) + 0.2(0.01) = 0.177 = 17.7\% \)

Portfolios

- A portfolio is a collection of assets
- An asset’s risk and return are important to how the stock affects the risk and return of the portfolio
- The risk-return trade-off for a portfolio is measured by the portfolio expected return and standard deviation, just as with individual assets
Example: Portfolio Weights

Suppose you have $15,000 to invest and you have purchased securities in the following amounts. What are your portfolio weights in each security?

- $2,000 of DCLK  
  \[ \text{DCLK: } \frac{2}{15} = .133 \]
- $3,000 of KO  
  \[ \text{KO: } \frac{3}{15} = .2 \]
- $4,000 of INTC  
  \[ \text{INTC: } \frac{4}{15} = .267 \]
- $6,000 of KEI  
  \[ \text{KEI: } \frac{6}{15} = .4 \]

Portfolio Expected Returns

The expected return of a portfolio is the weighted average of the expected returns of the respective assets in the portfolio.

\[ E(R_p) = \sum_{j=1}^{m} w_j E(R_j) \]

You can also find the expected return by finding the portfolio return in each possible state and computing the expected value as we did with individual securities.
Example: Expected Portfolio Returns

• Consider the portfolio weights computed previously. If the individual stocks have the following expected returns, what is the expected return for the portfolio?
  – DCLK: 19.65%
  – KO: 8.96%
  – INTC: 9.67%
  – KEI: 8.13%
• \( \text{E}(R_P) = .133(19.65) + .2(8.96) + .267(9.67) + .4(8.13) = 10.24\% \)

Expected versus Unexpected Returns

• Realized returns are generally not equal to expected returns
• There is the expected component and the unexpected component
  – At any point in time, the unexpected return can be either positive or negative
  – Over time, the average of the unexpected component is zero
Announcements and News

- Announcements and news contain both an expected component and a surprise component
- It is the surprise component that affects a stock’s price and therefore its return
- This is very obvious when we watch how stock prices move when an unexpected announcement is made, or earnings are different from anticipated

Efficient Markets

- Efficient markets are a result of investors trading on the unexpected portion of announcements
- The easier it is to trade on surprises, the more efficient markets should be
- Efficient markets involve random price changes because we cannot predict surprises
Systematic Risk

• Risk factors that affect a large number of assets
• Also known as non-diversifiable risk or market risk
• Includes such things as changes in GDP, inflation, interest rates, etc.

Unsystematic Risk

• Risk factors that affect a limited number of assets
• Also known as unique risk and asset-specific risk
• Includes such things as labor strikes, part shortages, etc.
Returns

• Total Return = expected return + unexpected return
• Unexpected return = systematic portion + unsystematic portion
• Therefore, total return can be expressed as follows:
• Total Return = expected return + systematic portion + unsystematic portion

Diversification

• Portfolio diversification is the investment in several different asset classes or sectors
• Diversification is not just holding a lot of assets
• For example, if you own 50 Internet stocks, then you are not diversified
• However, if you own 50 stocks that span 20 different industries, then you are diversified
Table 11.7

<table>
<thead>
<tr>
<th>(1) Number of Stocks in Portfolio</th>
<th>(2) Average Standard Deviation of Annual Portfolio Returns</th>
<th>(3) Ratio of Portfolio Standard Deviation to Standard Deviation of a Single Stock</th>
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<td>2</td>
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These figures are from Table 1 in Meir Statman, *How Many Stocks Make a Diversified Portfolio?* Journal of Financial and Quantitative Analysis 22 (September 1987), pp. 303—64. They were derived from E. J. Elton and M. J. Gruber, *Risk Reduction and Portfolio Size: An Analytic Solution*, Journal of Business 50 (October 1977), pp. 415—37.