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 = .3(.15) + .5(.10) + .2(.02) = .099 = 9.9%
- R_T = .3(.25) + .5(.20) + .2(.01) = .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
  - $3,000 of KO
  - $4,000 of INTC
  - $6,000 of KEI

•DCLK: 2/15 = .133
•KO: 3/15 = .2
•INTC: 4/15 = .267
•KEI: 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%
- $E(R_P) = .133(19.65) + .2(8.96) + .267(9.67) + .4(8.13) = 10.24\%$

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

(1) Number of Stocks in Portfolio	(2) Average Standard Deviation of Annual Portfolio Returns	(3) Ratio of Portfolio Standard Deviation to Standard Deviation of a Single Stock
1	49.24%	1.00
2	37.36	.76
4	29.69	.60
6	26.64	.54
8	24.98	.51
10	23.93	.49
20	21.68	.44
30	20.87	.42
40	20.46	.42
50	20.20	.41
100	19.69	.40
200	19.42	.39
300	19.34	.39
400	19.29	.39
500	19.27	.39
1,000	19.21	.39

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. 353—64They 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.