Portfolio Selection

Chapter 8
Charles P. Jones, Investments: Analysis and Management, Tenth Edition, John Wiley & Sons

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Portfolio Selection

- Diversification is key to optimal risk management
- Analysis required because of the infinite number of portfolios of risky assets
- How should investors select the best risky portfolio?
- How could riskless assets be used?

Building a Portfolio

- Step 1: Use the Markowitz portfolio selection model to identify optimal combinations
  - Estimate expected returns, risk, and each covariance between returns
- Step 2: Choose the final portfolio based on your preferences for return relative to risk

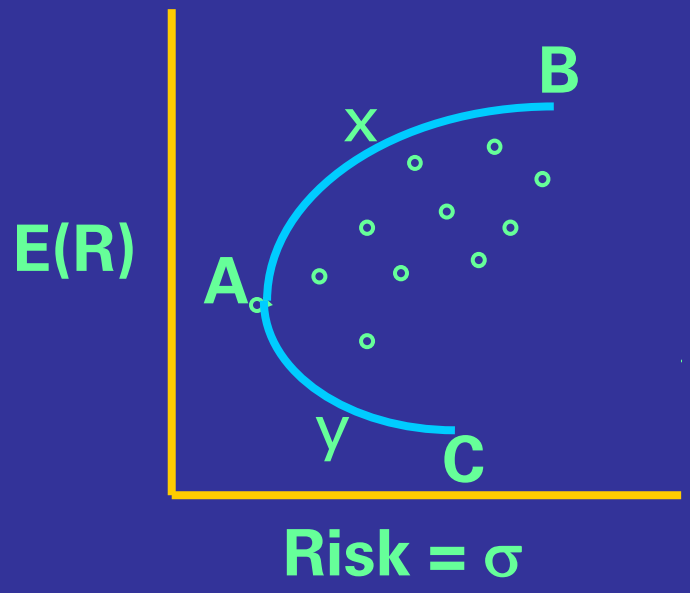
Portfolio Theory

- Optimal diversification takes into account all available information
- Assumptions in portfolio theory
  - A single investment period (one year)
  - Liquid position (no transaction costs)
  - Preferences based only on a portfolio's expected return and risk

An Efficient Portfolio

- Smallest portfolio risk for a given level of expected return
- Largest expected return for a given level of portfolio risk
- From the set of all possible portfolios
  - Only locate and analyze the subset known as the efficient set
    - Lowest risk for given level of return

Efficient Portfolios



- Efficient frontier or Efficient set (curved line from A to B)
- Global minimum variance portfolio (represented by point A)

Selecting an Optimal Portfolio of Risky Assets

- Assume investors are risk averse
- Indifference curves help select from efficient set
  - Description of preferences for risk and return
  - Portfolio combinations which are equally desirable
  - Greater slope implies greater the risk aversion

Selecting an Optimal Portfolio of Risky Assets

- Markowitz portfolio selection model
  - Generates a frontier of efficient portfolios which are equally good
  - Does not address the issue of riskless borrowing or lending
  - Different investors will estimate the efficient frontier differently
    - Element of uncertainty in application

The Single Index Model

- Relates returns on each security to the returns on a common index, such as the S&P 500 Stock Index
- Expressed by the following equation

$$R_i = \alpha_i + \beta_i R_M + e_i$$

- Divides return into two components
  - a unique part, α_i
  - a market-related part, $\beta_i R_M$

The Single Index Model

- b measures the sensitivity of a stock to stock market movements
- If securities are only related in their common response to the market
  - Securities covary together only because of their common relationship to the market index
  - Security covariances depend only on market risk and can be written as:

$$\sigma_{ij} = \beta_i \beta_j \sigma_M^2$$

The Single Index Model

- Single index model helps split a security's total risk into
  - Total risk = market risk + unique risk

$$\sigma_i^2 = \beta_i^2[\sigma_M] + \sigma_{ei}^2$$

- Multi-Index models as an alternative
  - Between the full variance-covariance method of Markowitz and the single-index model

Selecting Optimal Asset Classes

- Another way to use Markowitz model is with asset classes
  - Allocation of portfolio assets to broad asset categories
    - Asset class rather than individual security decisions most important for investors
  - Different asset classes offers various returns and levels of risk
    - Correlation coefficients may be quite low

Asset Allocation

- Decision about the proportion of portfolio assets allocated to equity, fixed-income, and money market securities
  - Widely used application of Modern Portfolio Theory
  - Because securities within asset classes tend to move together, asset allocation is an important investment decision
  - Should consider international securities, real estate, and U.S. Treasury TIPS

Implications of Portfolio Selection

- Investors should focus on risk that cannot be managed by diversification
- Total risk =systematic (nondiversifiable) risk + nonsystematic (diversifiable) risk
  - Systematic risk
    - Variability in a security's total returns directly associated with economy-wide events
    - Common to virtually all securities
  - Both risk components can vary over time
    - Affects number of securities needed to diversify

Portfolio Risk and Diversification