Chapter Preview: Chapter 11

Answer the following questions briefly:

1. Define covariance and correlation.

[Answer]

Covariance is the expected value of deviations of two returns from their average.

Positive covariance represents two assets moving together, tend to be above or below average at the same time.

Negative covariance implies stocks move in opposite directions; one will tend to be above average while the other is below average.

Correlation is calculated by dividing the covariance by the standard deviations of each return. The result is always between −1 and +1.

Correlation has the same sign as covariance. The closer to +1, the more the returns move together due to shared risk. If the correlation is 0, the returns are uncorrelated. The closer to −1, the more the returns move in opposite directions.

1. What is the efficient frontier?

[Answer]

An efficient frontier is a curve consisting of optimal portfolio combinations that provide the highest expected return at the same level of risk or the lowest risk at the same expected return. In other words, it means the best set of portfolios for investment efficiency.

1. Define the tangent portfolio.

[Answer]

The tangent portfolio refers to the most efficient of the optimal portfolios that can be created by combining risk-free assets (risk-free assets) and risk-free assets (stock, bonds, etc.). In other words, the portfolio at the point where the Capital Market Line (CML) connects the efficient frontiers and risk-free assets is in contact with the efficient frontiers.

1. What are two assumptions used to derive the CAPM?

[Answer]

#1. Investors choose portfolios based on mean-variance optimization.  
They seek to maximize expected return for a given level of risk, or minimize risk for a given level of return.

#2. All investors have homogeneous expectations and access to the same information.  
They evaluate assets with the same beliefs about expected returns, variances, and covariances, leading them to hold the same market portfolio.

1. What is the main purpose of CAPM?

[Answer]

The main purpose of the Capital Asset Pricing Model (CAPM) is to determine the expected return of an asset based on its sensitivity to market risk, as measured by beta (β), and the time value of money.

1. Define the capital market line (CML)?

[Answer]

The Capital Market Line (CML) represents the set of optimal portfolios that combine a risk-free asset with the market portfolio. It shows the highest possible expected return for a given level of total risk (standard deviation).

1. Explain the security market link (SML) using β.

[Answer]

The Security Market Line (SML) shows the relationship between an asset’s expected return and its beta (systematic risk).  
It is derived from the CAPM equation:

The SML allows us to evaluate whether a security is fairly priced:

If security lies above the SML → it's undervalued (offers higher return than required)

If it lies below the SML → it's overvalued

1. What do we know about the Sharpe ratio of the efficient portfolio?

[Answer]

The Sharpe ratio of the efficient portfolio is the highest among all possible portfolios. It represents the maximum reward-to-risk ratio, meaning it offers the greatest excess return per unit of risk. This portfolio lies on the tangency point between the Capital Market Line (CML) and the efficient frontier of risky assets.

1. Explain the difference between active and passive portfolio investment.

[Answer]

Active portfolio investment involves attempting to outperform the market by actively selecting securities and timing the market. It requires frequent trading, research, and management.  
In contrast, passive portfolio investment aims to match the market return by holding a diversified portfolio that replicates a market index, such as the S&P 500. It involves minimal trading and lower costs.

1. Explain why indexing is an attractive investment strategy.

[Answer]

Indexing is attractive because it offers broad market diversification, low costs, and competitive returns. Since most active managers fail to consistently beat the market after fees, indexing allows investors to achieve market-average returns with minimal effort and cost. It is especially effective for long-term investors who value simplicity, transparency, and lower risk.

**Problem 9.8**

In mid-2018, some analysts recommended that General Electric (GE) suspend its dividend payments to preserve cash needed for investment. Suppose you expected GE to stop paying dividends for two years before resuming an annual dividend of $1 per share, paid 3 years from now, growing by 3% per year. If GE's equity cost of capital is 9%, estimate the value of GE’s shares today.

[Answer]

**Problem 9.9**

In 2006 and 2007, Kenneth Cole Productions (KCP) paid annual dividends of $0.72. In 2008, KCP paid an annual dividend of $0.36, and then paid no further dividends through 2012. KCP was acquired at the end of 2012 for $15.25 per share.

1. What would an investor with perfect foresight of the above been willing to pay for KCP at the start of 2006? (Note: Because an investor with perfect foresight bears no risk, use a risk-free equity cost of capital of 5%.)

[Answer]

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 |
| Dividend | $0.72 | $0.72 | $0.36 | $0 | $0 | $0 | $15.25 |

1. Does your answer to (a) imply that the market for KCP stock was inefficient in 2006?

[Answer]

No, this does not imply that the market was inefficient. The $12.49 value is what a perfectly informed investor would have paid with full knowledge of future dividends and acquisition. In 2006, this information was not publicly available, so the market price would have reflected the expectations and risks based on information known at that time.

**Problem 9.10**

DFB, Inc., expects earnings at the end of this year of $4.19 per share, and it plans to pay a $2.43 dividend at that time. DFB will retain $1.76 per share of its earnings to reinvest in new projects with an expected return of 15.1% per year. Suppose DFB will maintain the same dividend payout rate, retention rate, and return on new investments in the future and will not change its number of outstanding shares.

1. What growth rate of earnings would you forecast for DFB?

[Answer]

1. If DFB’s equity cost of capital is 12.2%, what price would you estimate for DFB stock today?

[Answer]

1. Suppose DFB instead paid a dividend of $3.43 per share at the end of this year and retained only $0.76 per share in earnings. If DFB maintains this higher payout rate in the future, what stock price would you estimate now? Should DFB raise its dividend?

[Answer]

**Problem 9.17**

Maynard Steel plans to pay a dividend of $2.92 this year. The company has an expected earnings growth rate of 3.8% per year and an equity cost of capital of 10.4%.

1. Assuming Maynard’s dividend payout rate and expected growth rate remains constant, and Maynard does not issue or repurchase shares, estimate Maynard’s share price.

[Answer]

1. Suppose Maynard decides to pay a dividend of $0.97 this year and use the remaining $1.95 per share to repurchase shares. If Maynard’s total payout rate remains constant, estimate Maynard’s share price.

[Answer]

1. If Maynard maintains the same split between dividends and repurchases, and the same pay-out rate, as in part (b), at what rate are Maynard’s dividends, earnings per share, and share price expected to grow in the future?

[Answer]

If Maynard maintains the same split between dividends and repurchases, and the same total payout rate, then the total amount of cash returned to shareholders will continue to grow at the expected earnings growth rate of 3.8% per year.

Since share repurchases reduce the number of shares outstanding, the dividends per share, earnings per share (EPS), and share price will each grow at the same 3.8% rate over time.

**Problem 9.23**

Kenneth Cole Productions (KCP) was acquired in 2012 for a purchase price of $15.25 per share. KCP has 18.5 million shares outstanding, $45 million in cash, and no debt at the time of the acquisition.

1. Given a weighted average cost of capital of 11%, and assuming no future growth, what level of annual free cash flow would justify this acquisition price?

[Answer]

The acquisition price implies a free cash flow of approximately $25.97 million per year, assuming a WACC of 11% and no growth.

1. If KCP’s current annual sales are $480 million, assuming no net capital expenditures or increases in net working capital, and a tax rate of 35%, what EBIT margin does your answer in part (a) require?

[Answer]

Given $480 million in sales, a 35% tax rate, and no capital expenditures or changes in working capital, this corresponds to an EBIT margin of approximately 8.33%.

**Problem 9.24**

You notice that PepsiCo (PEP) has a stock price of $74.02 and EPS of $3.82. Its competitor, the Coca-Cola Company (KO), has EPS of $2.36. Estimate the value of a share of Coca-Cola stock using only this data.

[Answer]

**Problem 10.11**

Consider an investment with the following returns over four years:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Year | 1 | 2 | 3 | 4 |
| Return | 6% | 13% | -5% | 13% |

1. What is the compound annual growth rate (CAGR) for this investment over the four years?

[Answer]

1. What is the average annual return of the investment over the four years?

[Answer]

1. Which is a better measure of the investment’s past performance?

[Answer]

CAGR is a better measure of past performance because it reflects the actual annualized growth rate of the investment over time, taking into account the compounding effect.  
Unlike the arithmetic average return, CAGR shows how much the investment grew each year as if it had grown at a steady rate, which accurately reflects the performance of the investment over multiple periods.

1. If the investment’s returns are independent and identically distributed, which is a better measure of the investment’s expected return next year?

[Answer]

If returns are independent and identically distributed (i.i.d.), the best estimate of the investment’s expected return in the next period is the arithmetic average of past returns.  
This is because the arithmetic average is an unbiased estimator of the expected return when returns are drawn from the same distribution each year.

**Problem 10.20**

Consider two local banks. Bank A has 100 loans outstanding, each for $1 million, that it expects will be repaid today. Each loan has a 5% probability of default, in which case the bank is not repaid anything. The chance of default is independent across all the loans. Bank B has only one loan of $100 million outstanding, which it also expects will be repaid today. It also has a 5% probability of not being repaid. Explain the difference between the type of risk each bank faces. Which bank faces less risk? Why?

[Answer]

Bank A faces diversifiable, idiosyncratic risk because the default risk is spread across 100 independent loans.  
Due to diversification, the overall risk is reduced and outcomes are more predictable.  
Bank B faces undiversifiable, concentrated risk as its entire exposure depends on a single borrower.  
A default would result in a total loss of $100 million.  
Therefore, Bank A faces less risk due to the benefits of diversification and lower variance in total returns.

**Problem 10.21**

Using the data in Problem 20, calculate

1. The expected overall payoff of each bank.

[Answer]

Bank A:

expected payoff per loan = 0.95\*1M+0.05\*0 = 0.95M,

Total expected payoff = 100\*0.95M = 95M

Bank B:

expected payoff = 0.95\*100M + 0.05\*0 = 95M

1. The standard deviation of the overall payoff of each bank.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | E(X) | E(X^2) | V(X) | SD |
| Bank A | 0.95M | 9,5\*10^11 | 4.75\*10^10 | 2.18M |
| Bank B | 95M | 9,5\*10^15 | 4.75\*10^14 | 21.8M |

[Answer]

**Problem 10.23**

Consider an economy with two types of firms, S and I. S firms all move together. I firms move independently. For both types of firms, there is a 60% probability that the firms will have a 15% return and a 40% probability that the firms will have a -10% return. What is the volatility (standard deviation) of a portfolio that consists of an equal investment in 20 firms of (a) type S, and (b) type I?

[Answer]

**Problem 10.33**

Suppose the market portfolio is equally likely to increase by 30% or decrease by 10%.

1. Calculate the beta of a firm that goes up on average by 43% when the market goes up and goes down by 17% when the market goes down.

[Answer]

1. Calculate the beta of a firm that goes up on average by 18% when the market goes down and goes down by 22% when the market goes up.

[Answer]

1. Calculate the beta of a firm that is expected to go up by 4% independently of the market.

[Answer]

**Problem 10.34**

Suppose the risk-free interest rate is 4%.

1. i. Use the beta you calculated for the stock in Problem 33(a) to estimate its expected return.

[Answer]

ii. How does this compare with the stock’s actual expected return?

[Answer]

1. i. Use the beta you calculated for the stock in Problem 33(b) to estimate its expected return.

[Answer]

ii. How does this compare with the stock’s actual expected return?

[Answer]