Chapter Preview : Chapter 11

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Answer the following questions briefly.

1. Define covariance and correlation.
    - **Covariance** measures how two variables move together. Specifically, it looks at the expected product of the deviations of two returns from their means. Intuitively, if two stocks move together, their returns will tend to be above or below average at the same time, resulting in a positive covariance. If the stocks move in opposite directions, one will tend to be above average when the other is below average, resulting in a negative covariance.
    - **Correlation** normalizes the covariance to provide a dimensionless measure that indicates the strength and direction of the linear relationship between two variables. The correlation coefficient (ρ) ranges from -1 to 1, where 1 indicates a perfect positive relationship, -1 indicates a perfect negative relationship, and 0 indicates no relationship.
2. What is the efficient frontier?
    - The **efficient frontier** is a set of investment portfolios that offer the highest expected return for a given level of risk or the lowest risk for a given level of expected return, forming a boundary in risk-return space. It's about combination of investment products which is the most efficient regarding risk and return.
3. Define the tangent portfolio.
    - The **tangent portfolio** is the point where the capital market line (CML) touches the efficient frontier. It represents the optimal portfolio of risky assets that, when combined with the risk-free asset, offers the best risk-return trade-off. (Since the efficient frontier represents combination of portfolio, the point indicates a portfolio)
4. What are two assumptions used to derive the CAPM?

a. Investors can buy and sell all securities at competitive market prices (without incurring taxes
or transactions costs) and can borrow and lend at the risk-free interest rate

b. Investors hold only efficient portfolios of traded securities—portfolios that yield the maximum expected return for a given level of volatility

5. What is the main purpose of the CAPM?

- The main purpose of the CAPM is to determine the expected return of an asset based on its systematic risk (beta), helping investors make informed decisions about asset pricing and portfolio management.

6. Define the capital market line (CML).

- When the tangent line goes through the market portfolio, it is called the capital market line (CML). It represents the risk-return trade-off of efficient portfolios, showing the relationship between expected return and total risk (standard deviation) for portfolios that combine the risk-free asset with the market portfolio

7. Explain the security market line (SML) using β.

- SML plots the expected return of an asset against its beta (systematic risk). It shows the expected return for any given level of systematic risk, indicating whether an asset is overvalued or undervalued compared to the market.

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

- The Sharpe ratio of the efficient portfolio is maximized, indicating the highest risk-adjusted return among all possible portfolios.

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

a. **Active Investment:** Involves selecting stocks or other assets to outperform the market through research, timing, and analysis.

i. Individual Stock (Apple, Microsoft, Coca-Cola, etc,.)

b. **Passive Investment:** Involves replicating a market index to achieve market returns, focusing on low costs and minimal trading.

i. ETFs that follows S&P, Oil Price, Bitcoin, etc,.

10. Explain why indexing is an attractive investment strategy.

- It’s because it offers low costs, broad diversification, and typically better long-term performance compared to actively managed funds, due to lower fees and reduced trading costs.

Problems

Chapter 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.

$$P2 = Div/r - g$$

- After calculating p2, we can get present value by disouting p2 by equity cost of capital which is 9%.
- Answer : 14.028

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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.

   a. 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%.)

Year	2006	2007	2008	2009	2010	2011	2012
Div	$ 0.72	$ 0.72	$ 0.36	$ -	$ -	$ -	-
PV of Div	$ 0.69	$ 0.65	$ 0.31	$ -	$ -	$ -	$ 10.84
rate	5%						
Stock Price	$ 12.49						

- **Answer : $ 12.49**

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

- **No**. Investors at 2006 might have expected that the KCP will keep grow. In reality, Investors must take risk of uncertainty so the price of stock might be different, though, it does not imply that the market for KCP stock was inefficient.

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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.

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

        i. g = Retention Rate * Return on new Investment = 15.1% * 1.76/4.19 = 0.0634 ~= 6.3%

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

        i. 41.46758

    c. 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?

        i. Then the growth rate will be at arount 2.7%. Then the stock price estimated will be 36.25372 which is much lower than present estimated price. So they should now raise its dividend.

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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%.

    a. Assuming Maynard's dividend payout rate and expected growth rate remain constant, and Maynard does not issue or repurchase shares, estimate Maynard's share price.

        - Share price = 2.92/(10.4% - 3.8%) = $44.24

    b. 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.

- Using the total payout model, the price will be same as (a) since repurchase is considered similar to dividends. So, it is $44.24

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

- growth rate = equity cost of capital - dividends yield
- g = 0.104 - 0.97/44.24 = 0.08207 ~= 8.2%

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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.

a. 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?

- Acquisition Price : 18.5 mil * $15.25 = $282,125,000
- Enterprise Value = Acquired Price - Cash = $282,125,000 - 45,000,000 = $237,125,000
- Enterprise Value should be equal to discounted FCF. As a result, FCF should be $26,083,750

b. 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?

- EBIT = $26.1 million / (1 - 35%) = $40.1 million
- EBIT Margin = 40.1 million / $480 million = 8.4%

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24. You notice that PepsiCo (PEP) has a stock price of $72.62 and EPS of $3.80. Its competitor, the Coca-Cola Company (KO), has EPS of $1.89. Estimate the value of a share of Coca-Cola stock using only this data

a. PEP P/E = $72.68 / $3.8 = 19.1

b. Share price of KO = $1.89 × 19.1 = $**36.10**

Chapter 10

11. Consider an investment with the following returns over four years:

Year	1	2	3	4
Return	6%	13%	−5%	13%

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

- 6.49%

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

- 6.75%

c. Which is a better measure of the investment's past performance?

- CAGR

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

- arithmetic average

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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?

- Both has default risk, however, Bank B has only one loan which is not diversified while Bank A has 100 loans. It means bank A faces lower risk.

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21. Using the data in Problem 20, calculate
a. The expected overall payoff of each bank.
b. The standard deviation of the overall payoff of each bank.

a. Bank A = ($1 million* 0.95)* 100= $95 million

Bank B = ($100 million* 0.95)= $95 million

b. Bank A : 0.2179

Bank B : 21.79

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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?

Particulars	Probability (a)	Return (b)	Expected return (c = axb)
Return 1	70%	20%	14.00%
Return 2	30%	-30%	-9.00%
	100%	ER	5.00%

Particulars	Deviation	Square root of deviation	(e x a)
Return 1	0.15	0.0225	0.01575
Return 2	-0.35	0.1225	0.03675
		0.145	0.0525
		Variance	0.0525
		SD	0.229128785

Answer : 0.23

33. Suppose the market portfolio is equally likely to increase by 30% or decrease by 10%.
a. 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*.
b. 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*.
c. Calculate the beta of a firm that is expected to go up by 4% *independently* of the market.

a. The beta is 1.5

b. The beta is 1

c. The beta is 0

34. Suppose the risk-free interest rate is 4%.

a. i. Use the beta you calculated for the stock in Problem 33(a) to estimate its expected return.
ii. How does this compare with the stock's actual expected return?

b. i. Use the beta you calculated for the stock in Problem 33(b) to estimate its expected return.
ii. How does this compare with the stock's actual expected return?

a. The estimated expected return (13%) matches the actual expected return (13%).

b. The estimated expected return (-2%) matches the actual expected return (-2%).