

CHAPTER 10: INTRODUCTION TO RISK, RETURN, AND THE OPPORTUNITY COST OF CAPITAL

1. Rate of return:

- When investors purchase a stock or a bond, their return comes in two forms
- ✓ A dividend or interest payment
- ✓ A capital gain or capital loss

For example: Suppose you bought the stock of VNM at the beginning of 2007 when its price was \$75.06 per share. By the end of the year the value of that investment had appreciated to \$93.29. In addition, firm paid a dividend of \$1.37 a share.

- Capital gain= \$93.29 – \$75.06 = \$18.23
- Dividend= \$1.37

$$\text{Percentage return} = \frac{\text{capital gain} + \text{dividend}}{\text{initial share price}} = \frac{\$18.23 + \$1.37}{\$75.06} = 0.261 = 26.1\%$$

- The dividend yield is the dividend expressed as a percentage of the stock price at the beginning of the year

$$\text{Dividend yield} = \frac{\text{Dividend}}{\text{initial share price}} = \frac{\$1.37}{\$75.06} = 0.018 = 1.8\%$$

- Capital gain yield= $\frac{\text{capital gain}}{\text{initial share price}} = \frac{\$18.23}{\$75.06} = 0.243 = 24.3\%$

- The nominal rate of return & the real rate of return

- ✓ The nominal return measures how much more money you will have at the end of the year if you invest today.
- ✓ The real rate of return tells you how much more you will be able to purchase with your money at the end of the year.

➤ To change from a nominal to a real rate of return, we use the following relationship:

$$1 + \text{real rate of return} = \frac{1 + \text{nominal rate of return}}{1 + \text{inflation rate}}$$

Ex: previous Ex, in 2007, inflation is 4.2%. Calculate the real rate of return on VNM stock?

$$1 + \text{real rate of return} = \frac{1 + 0.261}{1 + 0.042} = 1.210$$

⇒ The real rate of return equals 21%

2. Market Indexes

Investors can choose from an enormous number of different securities

- The Dow Jones Industrial Average: value of a portfolio holding one share in each of 30 large firms

For example: Suppose that the Dow starts the day at a value of 12,000 and the rises by 120 points to new value of 12,120. Investors who own one share in each of the 30 firms make a capital gain of $120/12,000=0.01=1\%$

- The standard & Poor's Composite Index(S&P 500): value of a portfolio holding shares in 500 major companies. Holding are proportional to the number of shares in the issues.

3. Premium

- ❖ **Maturity Premium:** Extra average return from investing in long-term and short-term Treasury securities
- ❖ **Risk Premium:** is the difference between market return on security and risk-free return.

⇒ Rate of return on common stocks = risk free rate + market risk premium

4. Expected return= $\mu = \sum_{i=1}^n x_i p_i$

With x_i : rate of return in period of time i

p_i : percentage in period of time i

5. Measuring Risk

- **Variance: Average value of squared deviation from mean**

$$\text{Variance} = \sum_{i=1}^n p_i (x_i - \mu)^2$$

With μ : expected return

- **Standard Deviation: Square root of variance**

$$\text{Standard deviation} = \sqrt{\text{Var}}$$

- **Measuring the Variation in Stock Returns**

When estimating the spread of possible outcomes from investing in the stock market, most financial analysts start by assuming that the spread of returns in the past is a reasonable

indication of what could happen in the future. Therefore, they calculate the standard deviation of past returns.

For example: Using data in Table 11-4 page 322 to calculate

Year	Rate of return(%)	Deviation from Average Return(%)	Squared Deviation
2002	-20.9	-29.4	864.36
2003	31.6	23.1	533.61
2004	12.5	4.0	16.00
2005	6.4	-2.1	4.41
2006	15.8	7.3	53.29
2007	5.6	-2.9	8.41
Total	51.0		1,480.08
Average return = $\frac{51.0}{6} = 8.50\%$			
Variance = average of squared deviations = $\frac{1,480.08}{6} = 246.68$			
Standard deviation $\sqrt{Var} = 15.71\%$			

- The returns over the 6 years divided by 6 (51.0/6=8.50%)
- The average return over the 6 years between 2002 and 2007 was 8.50%
- Column 2 in table 11-4, in 2002 the return of -20.9% on common stocks
- The 6-year average by 29.4% (-20.9-8.50=29.4%)
- Column 3, we have square these divided from the average=1,480.80
- The variance of these square deviation 6 years = $\frac{1,480.08}{6} = 246.68$

The standard deviation = $\sqrt{Var} = \sqrt{246.68} = 15.71\%$

6. Portfolio Expected Return

- ❖ The expected return of a portfolio is the weighted average of the expected returns for each asset in the portfolio.
- ❖ Portfolio rate of return:

$$=(\text{fraction of portfolio in first asset} \times \text{rate of return on first asset}) + \\ (\text{fraction of portfolio in second asset} \times \text{rate of return on first asset})$$

For example: Autos have a weights of 0.75 and a rate of return of -8% in the recession and gold has a weights of 0.25 and a return of 20% in a recession? Calculate the portfolio rate of return?

$$\text{The portfolio rate of return} = (0.75 \times (-8\%)) + (0.25 \times 20\%) = -0.01 = -1\%$$