Fundamentals of Finance, Chapter 5

Solutions to Selected Problems

16. **Calculating Rates of Return** Referring to the Government of Canada stripped coupon we discussed at the very beginning of the chapter:

a. Based upon the \$29.19 price, what rate was the Government paying to borrow money?

Answer: This bond was maturing after 20 years with a face value of \$100. Hence a present value of \$29.19 means that

$$29.19 \ = \ \frac{100}{(1+r)^{20}} \quad \Rightarrow \quad r \ = \ \left(\frac{100}{29.19}\right)^{1/20} - 1 \ = \ 6.35\% \ .$$

b. Suppose that, on February 5, 2001, ths security's price was \$35.00. If an investor had purchased it for \$29.19 a year earlier and sold it on this day, what annual rate of return would she have earned?

Answer: The rate of return would have been

$$\frac{35 - 29.19}{29.19} \ - \ 1 \ = \ 19.9\% \ .$$

c. If an investor had purchased the security at market on February 5, 2001, and held it until it matured, what annual rate of return would she have earned?

Answer: We now have to calculate the interest on a stripped bond maturing in 19 years with a present value of \$35, which gives

$$35 \ = \ \frac{100}{(1+r)^{19}} \quad \Rightarrow \quad r \ = \ \left(\frac{100}{35}\right)^{1/19} - 1 \ = \ 5.68\% \ .$$

17. **Calculating Present Values** Suppose you are committed to owning a $120,000 Ferrari. If you believe your mutual fund can achieve a 9 percent annual rate of return and you want to buy the car in 10 years on the day you turn 30, how much must you invest today?

    Answer: We are looking for the present value of $120,000 in 10 years discounted at an annual interest rate of 9%, which gives

    $$\frac{120,000}{(1.09)^{10}} = \$50,679.30 \ .$$

18. **Calculating Future Values** You have made your first $2,000 contribution to your registered retirement plan. Assuming you earn an 8 percent rate of return and make no additional contributions, what will your account be worth when you retire in 45 years? What if you wait 10 years before contributing?

    Answer: If you invest right now, you will have

    $$\$2,000(1.08)^{45} = \$63,840.90$$

    when you retire. If you invest in ten years, you will have

    $$\$2,000(1.08)^{35} = \$25,570.69$$

    when you retire.

19. **Calculating Future Values** You are scheduled to receive $22,000 in two years. When you receive it, you will invest it for six more years at 6 percent per year. How much will you have in eight years?

    Answer: You'll have

    $$\$22,000(1.06)^{6} = \$31,207.42 \ .$$

20. **Calculating the Number of Periods** You expect to receive $80,000 at graduation in two years. You plan on investing it a 6 percent until you have $120,000. How long will you wait from now?

Answer: The number of years you need to wait after graduation, T, is such that

$$\begin{aligned}
80,000(1.06)^T &= 120,000 \\
(1.06)^T &= \frac{120,000}{80,000} \\
(1.06)^T &= 1.5 \\
\ln\left((1.06)^T\right) &= \ln(1.5) \\
T\ln(1.06) &= \ln(1.5),
\end{aligned}$$

which gives

$$T = \frac{\ln(1.5)}{\ln(1.06)} = 6.96 \text{ years.}$$

Hence, from now, you have to wait 8.96 years.