Investments, Chapter 4

Answers to Selected Problems

2. An open-end fund has a net asset value of \$10.70 per share. It is sold with a front-end load of 6 percent. What is the offering price?

   Answer: When a dollar is invested in this fund, \$0.94 is used to purchase assets. That is, 94 percent of offering price is worth one share. If NAV is the value of one share, then

$$0.94 \times \text{offering price} = \text{NAV} \quad \Rightarrow \quad \text{offering price} = \frac{10.70}{0.94} = \$11.38 \ .$$

3. If the offering price of an open-end fund is \$12.30 per share and the fund is sold with a front-end load of 5 percent, what is its net asset value?

   Answer: If 95% of the offering price is used to buy one share at net asset value, this means that

$$0.95 \times \text{offering price} = \text{NAV} \quad \Rightarrow \quad \text{NAV} = 0.95 \times 12.30 = \$11.69 \ .$$

4. The composition of the Fingroup Fund portfolio is as in Table 1. The has not borrowed any funds, but its accrued management fee with the portfolio manager currently totals \$30,000. There are 4 million shares outstanding. What is the net asset value of the fund?

   Answer: Total asset value is

$$200,000 \times 35 \ + \ 300,000 \times 40 \ + \ 400,000 \times 20 \ + \ 600,000 \times 25 \ = \ \$42,000,000 \ .$$

   Hence net asset value is given by

$$\text{NAV} = \frac{42,000,000 \ - \ 30,000}{4,000,000} = \$10.49 \ .$$

Stock	Shares	Price($)
A	200,000	35
B	300,000	40
C	400,000	20
D	600,000	25

Table 1: Fingroup Fund portfolio.

5. Reconsider the Fingroup Fund in the previous problem. If during the year the portfolio manager sells all of the holdings of stock D and replaced it with 200,000 shares of stock E at \$50 per share and 200,000 shares of stock F at \$25 per share, what is the portfolio turnover rate?

   Answer: The value of assets sold and replaced is \$15,000,000. The turnover rate is then

$$\frac{15,000,000}{42,000,000} = 35.7\% \ .$$

6. The Closed Fund is a closed-end investment company with a portfolio currently worth \$200 million. It has liabilities of \$3 million and 5 million shares outstanding.

   a. What is the NAV of the fund?

   Answer: NAV $= \frac{200-3}{5} =$ \$39.40.

   b. If the fund sells for \$36 per share, what is the percentage premium or discount that will appear in the listings in the financial pages?

   Answer: \$36 = (1- discount) $\times$ \$39.40, which implies a discount of 8.6%.

7. Corporate Fund started the year with a net asset value of \$12.50. By year-end, its NAV equalled \$12.10. The fund paid year-end distributions of income and capital gains of \$1.50. What was the rate of return to an investor in the fund?

   Answer: Rate of return is calculated as

$$\frac{\text{NAV}_{\text{end}} - \text{NAV}_{\text{start}} + \text{distributions}}{\text{NAV}_{\text{start}}} = \frac{12.1 - 12.5 + 1.5}{12.5} = 8.8\%.$$

8. A closed-end fund starts the year with a net asset value of \$12. By year-end, NAV equals \$12.10. At the beginning of the year, the fund was selling at a 2 percent premium to NAV. By the end of the year, the fund is selling at a 7 percent discount to NAV. The fund paid year-end distributions of income and capital gains of \$1.50.

   a. What is the rate of return to an investor in the fund during the year?

   Answer: Let NAV_0 and NAV_1 denote the fund's net asset value at the beginning of the year and at the end of the year, respectively. The return on the fund is then

$$\frac{(1-0.07)\text{NAV}_1-(1+0.02)\text{NAV}_0+1.5}{(1+0.02)\text{NAV}_0} = \frac{.93\times 12.10-1.02\times 12+1.5}{1.02\times 12} = 4.2\%\ .$$

   b. What would have been the rate of return to an investor who held the same securities as the fund manager during the year?

   Answer: An investor holding the securities directly would have avoided the premium at the beginning of the year and the discount at the end of the year. The return should be higher here since there was a premium at the time of the purchase and a discount at the time of the sale. The return from holding the securities directly would have been

$$\frac{\text{NAV}_1-\text{NAV}_0+1.5}{\text{NAV}_0} = \frac{12.10-12+1.5}{12} = 13.3\%\ .$$

13. Consider a mutual fund with \$200 million in assets at the start of the year and with 10 million shares outstanding. The fund invests in a portfolio of stocks that provides dividend income at the end of the year of \$2 million. The stocks included in the fund's portfolio increase in price by 8 percent, but no securities are sold, and there are no capital gains distributions. The fund charges other fees of 1 percent, which are deducted from portfolio assets at year-end. What is net asset value at the start and end of the year? What is the rate of return for an investor in the fund?

    Answer: Net asset value at the start of the year is $200/10 = \$20$. Net asset value at the end of the year is $(1.08)\times 200/10 = \$21.6$. Dividend per share is $2/10 = \$0.20$ and fees per share are $0.01 \times (1.08) \times 200/10 = \$0.216$. Hence the net return on the fund, including management fees, is

$$\frac{21.6 - 20 + 0.20 - 0.216}{20} = 7.92\%.$$

19. You are considering an investment in a mutual fund with a 4 percent front-end load and expense ratio of .5 percent. You can invest instead in a bank GIC paying 6 percent interest.

   a. If you plan to invest for two years, what annual rate of return must the fund portfolio earn for you to be better off in the fund than in the GIC? Assume annual compounding of returns.

   Answer: Let r denote the annual rate of return of the fund's assets. Each year the net return to a buyer of the fund is $1 + r - 0.005$. The return after two years of \$1 invested in the fund is then

$$(1 - 0.04) \times (1 + r - 0.005)^2.$$

   The compounded return on \$1 invested in the GIC is, on the other hand, $(1 + 0.06)^2$. Hence for the fund to do better than the GIC, we need

$$0.96 \times (0.995 + r)^2 > (1.06)^2 \quad \Rightarrow \quad r > 8.69\% .$$

   b. How does your answer change if you plan to invest for six years? Why does your answer change?

   Answer: We are comparing the same returns but over 6 years instead of 2. For the fund to be a better investment than the GIC, we need

$$0.96 \times (0.995 + r)^6 > (1.06)^6 \quad \Rightarrow \quad r > 7.22\% .$$

   The return on assets need not be as high as in the previous case because the front-end load is spread over 6 years instead of 2, reducing its effective cost to the investor.

c. Now suppose that instead of a front-end load the fund assesses an other charge of .75 percent per year. What annual rate of return must the fund portfolio earn for you to be better off in the fund than in the GIC? Does your answer in this case depend on the time horizon?

Answer: Without front-end load, all we are comparing are yearly returns and thus the horizon span does not matter anymore. For the fund to do better than the GIC, we need

$$1 \;+\; r \;-\; 0.005 \;-\; 0.0075 \;>\; 1.06 \qquad \Rightarrow \qquad r \;>\; 7.25\% \;.$$