Bodie, Kane, Marcus, Perrakis and Ryan, Chapter 3

Answers to Selected Problems

1. FBN Inc. has just sold 100,000 shares in an initial public offering. The underwriter's explicit fees were $70,000. The offering price for the shares was $50, but immediately upon issue the share price jumped to $53.

   a. What is your best guess as to the total cost to FBN of the equity issue?

   Answer: FBN not only paid $70,000 but shares seemed to have been underpriced by $3 and thus the overall cost to FBN is

   $$\$70,000 \ + \ \$3 \ \times \ 100,000 \ = \ \$370,000.$$

   b. Is the entire cost of the underwriting a source of profit to the underwriters?

   Answer: No. The $3 per share due to underpricing is not a source of profit for the underwriter.

2. Suppose that you sell short 100 shares of Alcan, now selling at $70 per share.

   a. What is your possible maximum loss?

   Answer: There is no limit to the maximum possible loss as the price of the underlying asset may rise to infinity.

   b. What happens to the maximum loss if you simultaneously place a stop-buy order at $78?

   Answer: Then the maximum possible loss is $8 per share, which means $800.

3. Dée Trader opens a brokerage account, and purchases 300 shares of Internet Dreams at $40 per share. She borrows $4,000 from her broker to help pay for the purchase. The interest rate on the loan is 8 percent.

   a. What is the margin in Dée's account when she first purchase the stock?

   Answer: The value of total assets in Dée's account is $40 \times 300 = \$12,000$, her total liabilities are $4,000 and thus her equity is $12,000 - $4,000 = $8,000, which is also called the margin. The margin ratio in her account when she purchases the stock is then
   $$\frac{8,000}{12,000} = 75\% \ .$$

   b. If the price falls to $30 per share by the end of the year, what is the remaining margin in her account? If the maintenance margin requirement is 30 percent, will she receive a margin call?

   Answer: With a price of $30 per share, the total assets value in Dée's account is $30 \times 300 = \$9,000$. The amount of money she owes to her broker is then $4,000 \times 1.08 = \$4,320$, which implies a margin of $9,000 - \$4,320 = \$4,680$, and thus a margin ratio of
   $$\frac{4,680}{9,000} = 52\% \ .$$
   Since 52% is well above 30%, she won't receive a margin call.

   c. What is the rate of return on her investment?

   Answer: Dée initially invested $8,000 and she ends up with $9,000 - \$4,320 = \$4,680$ at the end of the year, which means a rate of return of

   $$\frac{4,680 - 8,000}{8,000} = -41.5\% \ .$$

4. Old Economy Traders (OET) opened an account to short-sell 1,000 shares of Internet Dreams from the previous problem. The initial margin requirement was 50 percent. (The margin account pays no interest.) A year later, the price of Internet Dreams has risen from $40 to $50, and the stock has paid a dividend of $2 per share.

a. What is the remaining margin in the account.

Answer: To sell short the shares, OET had to pay 50% of their market value and thus the value of total assets in OET's account is initially $40,000 + \$20,000 = \$60,000$. At the time of the sale, total liabilities are \$40,000 and thus OET's margin is initially $\$60,000 - \$40,000 = \$20,000$. At the end of the year, total liabilities are \$50,000, the market value of the 1,000 shares, plus the dividends for all borrowed shares, i.e. $\$2 \times 1,000 = \$2,000$ (OET has to pay these dividends to the lender(s) of the shares since he (they) would have received them had the shares not been borrowed). Hence OET's margin at the end of the year is $\$60,000 - \$52,000 = \$8,000$.

b. If the maintenance margin requirement is 30 percent, will Old Economy receive a margin call?

Answer: OET's margin ratio is

$$\frac{\text{OET's equity}}{\text{value of stock owed}} = \frac{8,000}{50,000} = 16\%$$

so yes, OET will receive a margin call.

c. What is the rate of return on the investment?

Answer: OET initially invested \$20,000 and ended up with \$8,000. This means a return of

$$\frac{8,000 - 20,000}{20,000} = -60\%.$$

5. Consider the limit-order book depicted in Table 5. The last trade in the stock took place at a price of \$50.

a. If a market-buy order for 100 shares comes in, at what price will it be filled?

Answer: It will be filled at the lowest asked price, i.e. \$50.25 per share. Note that all the shares will trade at this price since the limit-sell order involves 100 shares, too.

3

Limit-Buy Order		Limit-Sell Order	
Price($)	**Shares**	**Price($)**	**Shares**
49.75	500	50.25	100
49.50	800	51.50	100
49.25	500	54.75	300
49.00	200	58.25	100
48.50	600		

Table 1: Limit-order book for problem 5.

b. At what price would the next market-buy order be filled?

Answer: The first 100 shares will trade at $51.50, which is the second lowest asked price.

c. If you were the specialist, would you desire to increase or decrease your inventory of this stock?

Answer: The volume of sell orders is small compared to the volume of buy orders. Buy orders are all slightly below 50$, whereas sellers' demanded prices are more dispersed, which means that there is very little downside pressure on the stock. Buying the stock thus seems very tempting, so a pecialist would rather increase his/her inventory in this stock.

6. Suppose that BMO is currently selling at $80 per share. You buy 250 shares, using $15,000 of your own money and borrowing the remainder of the purchase price from your broker. The rate on the margin loan is 8 percent.

a. What is the percentage increase in the net worth of your brokerage account if the price of BMO *immediately* changes to (i) $88; (ii) $80; (iii) $72? What is the relationship between your percentage return and the percentage change in the price of BMO?

Answer: The value of the 250 shares at the time of the purchase is $20,000

and thus \$5,000 had to be borrowed from the broker. With an immediate price change, we don't need to worry about the interest rate on the loan. If the price of BMO stock jumps to p, say, the return on the investment, denoted r_p, is given by

$$r_p = \frac{p \times 250 - 5,000 - 15,000}{15,000} = \frac{250p - 20,000}{15,000} .$$

Hence $r_{88} = 13.33\%$, $r_{80} = 0$, $r_{72} = -13.33\%$.

Let $p = (1 + \alpha)80$ denote the stock price following the jump, α indicating the percentage change in the stock price. The return on the investment, given α, is then given by

$$r_\alpha = \frac{(1+\alpha)80 \times 250 - 5,000 - 15,000}{15,000} = \frac{(1+\alpha)20,000 - 20,000}{15,000} .$$

b. If the minimum margin is 25 percent, how low can BMO's price fall before you get a margin call?

Answer: For a price p, the margin ratio is

$$\frac{250p - 5,000}{250p} .$$

Thus a margin ratio 0.25 implies that

$$\frac{250p - 5,000}{250p} = 0.25 \implies 250p - 5,000 = 62.5p$$

$$\implies p = \frac{5,000}{187.5} = 26.67 .$$

c. How would your answer to (b) change if you had financed the initial purchase with only \$10,000 of your own money?

Answer: In this case, the loan from the broker would be \$10,000 and thus, for a price p, the margin ratio would be

$$\frac{250p - 10,000}{250p} .$$

A margin ratio 0.25 would then imply

$$\frac{250p - 10,000}{250p} = 0.25 \implies 250p - 10,000 = 62.5p$$

$$\implies p = \frac{10,000}{187.5} = 53.33 .$$

d. What is the rate of return on your margined position (assuming again that you invest \$15,000 of your own money) if BMO is selling *after one year* at (i) \$88; (ii) \$80; (iii) \$72? What is the relationship between your percentage return and the percentage change in the price of BMO? Assume that BMO pays no dividend.

Answer: Let p denote the price of BMO's stock at the end of the year. The return on this investment, r_p, is then

$$r_p = \frac{250p - (1.08)5,000 - 15,000}{15,000} = \frac{250p - 20,400}{15,000} .$$

Thus $r_{88} = 10.67\%$, $r_{80} = -2.67\%$ and $r_{72} = -16\%$.

The relationship between the percent change in BMO's stock price, α, and the investor's return is given by

$$r_\alpha = \frac{250(1 + \alpha)80 - 20,400}{15,000} .$$

e. Continue to assume that a year has passed. How low can BMO price fall before you get a margin call?

Answer: For a price p, the margin ratio is then

$$\frac{250p - 5,400}{250p} .$$

Thus a margin ratio 0.25 implies that

$$\frac{250p - 5,400}{250p} = 0.25 \implies 250p - 5,400 = 62.5p$$

$$\implies p = \frac{5,400}{187.5} = 28.80 .$$

6

7. Suppose that you sell short 250 shares of BMO, currently selling at $80 per share, and give your broker $15,000 to establish your margin account. Assume a zero interest rate on the margin account.

a. What is your rate of return after one year if BMO stock is selling at (i) $88; (ii) $80; (iii) $72? Assume that BMO pays no dividend.

Answer: If BMO's stock sells at price p at the end of the year, you end up with $250(80 - p) + \$15,000$. Hence the return on this investment, r_p, is given by
$$\frac{250 \times (80 - p) + 15,000 - 15,000}{15,000} = \frac{80 - p}{60}.$$
Thus $r_{88} = -13.33\%$, $r_{80} = 0\%$ and $r_{72} = 13.33\%$.

b. If the margin requirement is 25 percent, how high can BMO's price rise before you get a margin call?

Answer: There a total of $35,000 in the margin account (sale of 250 shares at $80 each plus the $15,000 deposit). Total liabilities are $250p$. There's a margin call when
$$\frac{35,000 - 250p}{250p} = .25,$$
which implies $p = \$112$.

c. Redo part (a) and (b) now assuming that BMO pays a year-end dividend of $2 per share.

Answer: The return on the investment is then, for a price p at the end of the year,
$$\frac{250 \times (80 - p) + 15,000 - 15,000 - 500}{15,000} = \frac{78 - p}{60}.$$
Thus $r_{88} = -16.67\%$, $r_{80} = -3.33\%$ and $r_{72} = 10\%$.

Total assets in the margin account at the end of the year are now $\$35,000 - \$500 = \$34,500$, thus a margin call occurs if
$$\frac{34,500 - 250p}{250p} = .25,$$
which implies $p = \$110.40$.