

For both risk and return, increasing order is *b, c, a, d*. On average, the higher the risk of an investment, the higher is its expected return.

2. Since the price didn't change, the capital gains yield was zero. If the total return was four percent,

then the dividend yield must be four percent.

3. It is impossible to lose more than -100 percent of your investment. Therefore, return distributions

are cut off on the lower tail at -100 percent; if returns were truly normally distributed, you could lose

much more.

4. To calculate an arithmetic return, you simply sum the returns and divide by the number of returns.

As such, arithmetic returns do not account for the effects of compounding. Geometric returns do account for the effects of compounding. As an investor, the more important return of an asset is the

geometric return.

5. Blume's formula uses the arithmetic and geometric returns along with the number of observations to

approximate a holding period return. When predicting a holding period return, the arithmetic return

will tend to be too high and the geometric return will tend to be too low. Blume's formula statistically adjusts these returns for different holding period expected returns.

6. T-bill rates were highest in the early eighties since inflation at the time was relatively high. As we

discuss in our chapter on interest rates, rates on T-bills will almost always be slightly higher than the

rate of inflation.

7. Risk premiums are about the same whether or not we account for inflation. The reason is that risk

premiums are the difference between two returns, so inflation essentially nets out.

8. Returns, risk premiums, and volatility would all be lower than we estimated because after-tax returns

are smaller than pretax returns.

9. We have seen that T-bills barely kept up with inflation before taxes. After taxes, investors in T-bills

actually lost ground (assuming anything other than a very low tax rate). Thus, an all T-bill strategy

will probably lose money in real dollars for a taxable investor.

10. It is important not to lose sight of the fact that the results we have discussed cover over 70 years,

well beyond the investing lifetime for most of us. There have been extended periods during which small stocks have done terribly. Thus, one reason most investors will choose not to pursue a 100 percent stock (particularly small-cap stocks) strategy is that many investors have relatively short horizons, and high volatility investments may be very inappropriate in such cases. There are other reasons, but we will defer discussion of these to later chapters.

B-2 SOLUTIONS -

Solutions to Questions and Problems

NOTE: All end of chapter problems were solved using a spreadsheet. Many problems require multiple

steps. Due to space and readability constraints, when these intermediate steps are included in this

solutions manual, rounding may appear to have occurred. However, the final answer for each problem is

found without rounding during any step in the problem.

Core Questions

1. Total dollar return = $100(\$97 - 89 + 1.20) = \920.00

Whether you choose to sell the stock or not does not affect the gain or loss for the year, your stock is

worth what it would bring if you sold it. Whether you choose to do so or not is irrelevant (ignoring

commissions and taxes).

2. Capital gains yield = $(\$97 - 89)/\$89 = 8.99\%$

Dividend yield = $\$1.20/\$89 = 1.35\%$

Total rate of return = $8.99\% + 1.35\% = 10.34\%$

3. Dollar return = $750(\$81.50 - 89 + 1.20) = -\$4,275.00$

Capital gains yield = $(\$81.50 - 89)/\$89 = -8.43\%$

Dividend yield = $\$1.20/\$89 = 1.35\%$

Total rate of return = $-8.43\% + 1.35\% = -7.08\%$

4. a. average return = 5.8%, average risk premium = 2.0%

b. average return = 3.8%, average risk premium = 0%

c. average return = 12.2%, average risk premium = 8.4%

d. average return = 16.9%, average risk premium = 13.1%

5. Jurassic average return = $(-8\% + 34\% - 16\% + 8\% + 19\%) / 5 = 7.40\%$

Stonehenge average return = $(-18\% + 27\% - 9\% + 24\% + 17\%) / 5 = 8.20\%$

6. Stock A: $R_A = (0.24 + 0.06 - 0.08 + 0.19 + 0.15)/5 = 0.56 / 5 = 11.20\%$

Var = $1/4[(.24 - .112)^2 + (.06 - .112)^2 + (-.08 - .112)^2 + (.19 - .112)^2 + (.15 - .112)^2] = 0.015870$

Standard deviation = $(0.015870)^{1/2} = 0.1260 = 12.60\%$

Stock B: $R_B = (0.32 + 0.02 - 0.15 + 0.21 + 0.11)/5 = 0.51 / 5 = 10.20\%$

Var = $1/4[(.32 - .102)^2 + (.02 - .102)^2 + (-.15 - .102)^2 + (.21 - .102)^2 + (.11 - .102)^2] = 0.032370$

Standard deviation = $(0.032370)^{1/2} = 0.1799 = 17.99\%$

7. The capital gains yield is $(\$74 - 66)/\$74 = -.1081$ or -10.81% (notice the negative sign). With a

dividend yield of 2.4 percent, the total return is -8.41% .

8. Geometric return = $[(1 + .11)(1 - .06)(1 - .12)(1 + .19)(1 + .37)]^{(1/5)} - 1 = .0804$

9. Arithmetic return = $(.29 + .11 + .18 - .06 - .19 + .34) / 6 = .1117$

Geometric return = $[(1 + .18)(1 + .11)(1 + .18)(1 - .06)(1 - .19)(1 + .34)]^{(1/6)} - 1 = .0950$

CHAPTER 1 B-3

Intermediate Questions

10. That's plus or minus one standard deviation, so about two-thirds of the time or two years out of

three. In one year out of three, you will be outside this range, implying that you will be below it one

year out of six and above it one year out of six.

11. You lose money if you have a negative return. With an 8 percent expected return and a 4 percent

standard deviation, a zero return is two standard deviations below the average. The odds of being outside (above or below) two standard deviations are 5 percent; the odds of being below are half that, or 2.5 percent. (It's actually 2.28 percent.) You should expect to lose money only 2.5 years out

of every 100. It's a pretty safe investment.

12. The average return is 5.8 percent, with a standard deviation of 9.2 percent, so $\text{Prob}(\text{Return} < -3.4)$ or

Return > 15.0) $\approx 1/3$, but we are only interested in one tail; Prob(Return < -3.4) $\approx 1/6$, which is half of $1/3$.

95%: $5.8 \pm 2\sigma = 5.8 \pm 2(9.2) = -12.6\%$ to 24.2%

99%: $5.8 \pm 3\sigma = 5.8 \pm 3(9.2) = -21.8\%$ to 33.4%

13. Expected return = 16.9% ; $\sigma = 33.2\%$. Doubling your money is a 100% return, so if the return distribution is normal, $Z = (100 - 16.9)/33.2 = 2.50$ standard deviations; this is in-between two and

three standard deviations, so the probability is small, somewhere between $.5\%$ and 2.5% (why?). Referring to the nearest Z table, the actual probability is $= 0.616\%$, or less than once every 100 years.

Tripling your money would be $Z = (200 - 16.9)/33.2 = 5.52$ standard deviations; this corresponds to

a probability of (much) less than 0.5% , or once every 200 years. (The actual answer is less than once

every 1 million years, so don't hold your breath.)

14. Year Common stocks T-bill return Risk premium

1973 -14.69% 7.29% -21.98%

1974 -26.47% 7.99% -34.46%

1975 37.23% 5.87% 31.36%

1796 23.93% 5.07% 18.86%

1977 -7.16% 5.45% -12.61%

12.84% 31.67% -18.83%

a. Annual risk premium = Common stock return - T-bill return (see table above).

b. Average returns: Common stocks = $12.84 / 5 = 2.57\%$; T-bills = $31.67 / 5 = 6.33\%$;

Risk premium = $-18.83 / 5 = -3.77\%$

c. Common stocks: Var = $1/4[(-.1469 - .0257)^2 + (-.2647 - .0257)^2 + (.3723 - .0257)^2 + (.2393 - .0257)^2 + (-.0716 - .0257)^2] = 0.072337$

Standard deviation = $(0.072337)^{1/2} = 0.2690 = 26.90\%$

T-bills: Var = $1/4[(.0729 - .0633)^2 + (.0799 - .0633)^2 + (.0587 - .0633)^2 + (.0507 - .0633)^2 + (.0545 - .0633)^2] = 0.0001565$

Standard deviation = $(0.000156)^{1/2} = 0.0125 = 1.25\%$

Risk premium: Var = $1/4[(-.2198 - .0377)^2 + (-.3446 - .0377)^2 + (.3136 - .0377)^2 + (.1886 - .0377)^2 + (-.1261 - .0377)^2] = 0.077446$

Standard deviation = $(0.077446)^{1/2} = 0.2783 = 27.83\%$

B-4 SOLUTIONS -

d. Before the fact, the risk premium will be positive; investors demand compensation over and above the risk-free return to invest their money in the risky asset. After the fact, the observed risk premium can be negative if the asset's nominal return is unexpectedly low, the risk-free return is unexpectedly high, or any combination of these two events.

15. $(\$197,000 / \$1,000)^{1/48} - 1 = .1164$ or 11.64%

16. 5 year estimate = $[(5 - 1)/(40 - 1)] \times 10.15\% + [(40 - 5)/(40 - 1)] \times 12.60\% = 12.35\%$

10 year estimate = $[(10 - 1)/(40 - 1)] \times 10.15\% + [(40 - 10)/(40 - 1)] \times 12.60\% = 12.03\%$

20 year estimate = $[(20 - 1)/(40 - 1)] \times 10.15\% + [(40 - 20)/(40 - 1)] \times 12.60\% = 11.41\%$

17. Small company stocks = $(\$6,816.41 / \$1)^{1/77} - 1 = .1215$ or 12.15%

Long-term government bonds = $(\$59.70 / \$1)^{1/77} - 1 = .0545$ or 5.45%

Treasury bills = $(\$17.48 / \$1)^{1/77} - 1 = .0379$ or 3.79%

Inflation = $(\$10.09 / \$1)^{1/77} - 1 = .0305$ or 3.05%

18. $R_A = (0.21 + 0.07 - 0.19 + 0.16 + 0.13)/5 = 7.60\%$

$R_G = [(1 + .21)(1 + .07)(1 - .19)(1 + .16)(1 + .12)]^{1/5} - 1 = 6.57\%$

19. $R_1 = (\$61.56 - 58.12 + 0.55) / \$58.12 = 6.87\%$

$R_2 = (\$54.32 - 61.56 + 0.60) / \$61.56 = -10.79\%$

$$R_3 = (\$64.19 - 54.32 + 0.63) / \$54.32 = 19.33\%$$

$$R_4 = (\$74.13 - 64.19 + 0.72) / \$64.19 = 16.61\%$$

$$R_5 = (\$79.32 - 74.13 + 0.81) / \$74.13 = 8.09\%$$

$$R_A = (0.0687 - .1079 + 0.1933 + 0.1661 + 0.0809) / 5 = 8.02\%$$

$$R_G = [(1 + .0687)(1 - .1079)(1 + .1933)(1 + .1661)(1 + .0809)]^{1/5} - 1 = 7.48\%$$

$$20. \text{ Stock A: } R_A = (0.11 + 0.11 + 0.11 + 0.11 + 0.11) / 5 = 11.00\%$$

$$\text{Var} = 1/4[(.11 - .11)^2 + (.11 - .11)^2 + (.11 - .11)^2 + (.11 - .11)^2 + (.11 - .11)^2] = 0.000000$$

$$\text{Standard deviation} = (0.000)^{1/2} = 0.000 = 0.00\%$$

$$R_G = [(1 + .11)(1 + .11)(1 + .11)(1 + .11)(1 + .11)]^{1/5} - 1 = 11.00\%$$

$$\text{Stock B: } R_A = (0.08 + 0.15 + 0.10 + 0.09 + 0.13) / 5 = 11.00\%$$

$$\text{Var} = 1/4[(.08 - .11)^2 + (.15 - .11)^2 + (.10 - .11)^2 + (.09 - .11)^2 + (.13 - .11)^2] = 0.000850$$

$$\text{Standard deviation} = (0.000850)^{1/2} = 0.0292 = 2.92\%$$

$$R_G = [(1 + .08)(1 + .15)(1 + .10)(1 + .09)(1 + .13)]^{1/5} - 1 = 10.97\%$$

$$\text{Stock C: } R_A = (-0.15 + 0.34 + 0.16 + 0.08 + 0.12) / 5 = 11.00\%$$

$$\text{Var} = 1/4[(-.15 - .11)^2 + (.34 - .11)^2 + (.16 - .11)^2 + (.08 - .11)^2 + (.12 - .11)^2] = 0.031000$$

$$\text{Standard deviation} = (0.031000)^{1/2} = 0.1761 = 17.61\%$$

$$R_G = [(1 - .15)(1 + .34)(1 + .16)(1 + .08)(1 + .12)]^{1/5} - 1 = 9.83\%$$

The larger the standard deviation, the greater will be the difference between the arithmetic return and

geometric return. In fact, for lognormally distributed returns, another formula to find the geometric

return is arithmetic return $- \frac{1}{2}$ variance. Therefore, for Stock C, we get $.1100 - \frac{1}{2}(.031000) = .0945$.

The difference in this case is because the return sample is not a true lognormal distribution.

CHAPTER 1 B-5

Spreadsheet Problems

Chapter 2

Buying and Selling Securities

Concept Questions

1. Purchasing on margin means borrowing some of the money used to buy securities. You do it because

you desire a larger position than you can afford to pay for, recognizing that using margin is a form of financial leverage. As such, your gains and losses will be magnified. Of course, you hope you only

experience the gains.

2. Shorting a security means borrowing it and selling it, with the understanding that at some future date

you will buy the security and return it, thereby “covering” the short. You do it because you believe

the security’s value will decline, so you hope to sell high now, then buy low later.

3. Margin requirements amount to security deposits. They exist to protect your broker against losses.

4. Asset allocation means choosing among broad categories such as stocks and bonds. Security selection means picking individual assets within a particular category, such as shares of stock in particular companies.

5. They can be. Market timing amounts to active asset allocation, moving money in and out of certain

broad classes (such as stocks) in anticipation of future market direction. Of course, market timing and passive asset allocation are not the same.

6. Some benefits from street name registration include:

a. The broker holds the security, so there is no danger of theft or other loss of the security. This is important because a stolen or lost security cannot be easily or cheaply replaced.

b. Any dividends or interest payments are automatically credited, and they are often credited more

quickly (and conveniently) than they would be if you received the check in the mail.

c. The broker provides regular account statements showing the value of securities held in the account and any payments received. Also, for tax purposes, the broker will provide all the needed information on a single form at the end of the year, greatly reducing your record-keeping requirements.

d. Street name registration will probably be required for anything other than a straight cash purchase, so, with a margin purchase for example, it will be required.

7. Probably none. The advice you receive is unconditionally *not* guaranteed. If the recommendation

was grossly unsuitable or improper, then arbitration is probably your only possible means of recovery. Of course, you can close your account, or at least what's left of it.

8. If you buy (go long) 500 shares at \$18, you have a total of \$9,000 invested. This is the most you can

lose because the worst that could happen is that the company could go bankrupt, leaving you with worthless shares. There is no limit to what you can make because there is no maximum value for your shares – they can increase in value without limit.

CHAPTER 2 B-7

9. If the asset is illiquid, it may be difficult to quickly sell it during market declines, or to purchase it

during market rallies. Hence, special care should always be given to investment positions in illiquid

assets, especially in times of market turmoil

10. The worst that can happen to a share of stock is for the firm to go bankrupt and the stock to become

worthless, so the maximum gain to the short position is \$60,000. However, since the stock price can

rise without limit, the maximum loss to a short stock position is unlimited.

Solutions to Questions and Problems

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steps. Due to space and readability constraints, when these intermediate steps are included in this solutions manual, rounding may appear to have occurred. However, the final answer for each problem is

found without rounding during any step in the problem.

Core questions

1. Maximum investment = $\$13,000 / .50 = \$26,000$

Number of shares = $\$26,000 / \$83 \text{ per share} = 313.25 \text{ or } 313 \text{ shares}$

2. Margin loan = $(\$65 \times 400) - \$15,000 = \$11,000$

Margin requirement = $\$15,000 / (\$65 \times 400) = 0.5769 \text{ or } 57.69\%$

3. Terminal price = \$75

Without margin = $(\$75 - 65) / \$65 = 15.38\%$

With margin = $\{(\$75 \times 400) - [(\$65 \times 400) - \$15,000] - \$15,000\} / \$15,000 = 26.67\%$

Terminal price = \$65

Without margin = $(\$65 - 65) / \$65 = 0\%$

With margin = $[(\$65 \times 400) - [(\$65 \times 400) - \$15,000] - \$15,000] / \$15,000 = 0\%$

4. Initial deposit = $0.40 \times (\$65 \times 400) = \$10,400$

Terminal price = \$75

Without margin = $(\$75 - 65) / \$65 = 15.38\%$

With margin = $\{(\$75 \times 400) - [(\$65 \times 400) - \$10,400] - \$10,400\} / \$10,400 = 38.46\%$

Terminal price = \$65

Without margin = $(\$65 - 65) / \$65 = 0\%$

With margin = $\{(\$65 \times 400) - [(\$65 \times 400) - \$10,400] - \$10,400\} / \$10,400 = 0\%$

A lower initial margin requirement will make the returns more volatile. In other words, a stock price

increase will increase the return, and a stock price decrease will cause a greater loss.

5. Maximum purchase = $\$13,000 / .60 = \$21,666.67$

6. Amount borrowed = $(900 \times \$85)(1 - .60) = \$30,600$

Margin call price = $\$30,600 / [900 - (.35 \times 900)] = \52.31

7. Amount borrowed = $(400 \times \$49)(1 - .50) = \$9,800$

Margin call price = $\$9,800 / [400 - (.25 \times 400)] = \32.67

Stock price decline = $(\$32.67 - 49.00) / \$49.00 = -33.33\%$

B-8 SOLUTIONS

8. Proceeds from short sale = $900 \times \$64 = \$57,600$

Initial deposit = $\$57,600(.50) = \$28,800$

Account value = $\$57,600 + 28,800 = \$86,400$

Margin call price = $\$86,400 / [900 + (.30 \times 900)] = \73.85

9. Proceeds from short sale = $1,000(\$56) = \$56,000$

Initial deposit = $\$56,000(.50) = \$28,000$

Account value = $\$56,000 + 28,000 = \$84,000$

Margin call price = $\$84,000 / [1,000 + (.30 \times 1,000)] = \64.62

Account equity = $\$84,000 - (1,000 \times \$64.62) = \$19,380$

10. Pretax return = $(\$98.00 - 86.00 + 1.40) / \$86.00 = 15.58\%$

Aftertax capital gains = $(\$98.00 - 86.00)(1 - .20) = \9.60

Aftertax dividend yield = $\$1.40(1 - .31) = \0.966

Aftertax return = $(\$9.60 + .966) / \$86.00 = 12.29\%$

Intermediate questions

11. Assets Liabilities and account equity

313 shares \$25,979 .00 Margin loan \$12,989.50

Account equity 12,989.50

Total \$25,979 .00 Total \$25,979.00

Stock price = \$90

Assets Liabilities and account equity

320 shares \$28,170.00 Margin loan \$12,989.50

Account equity 15,180.50

Total \$28,170.00 Total \$28,170.00

Margin = $\$15,180.50 / \$28,170 = 53.89$

Stock price = \$65

Assets Liabilities and account equity

320 shares \$20,345.00 Margin loan \$12,989.50

Account equity 7,355.50

Total \$20,345.00 Total \$20,345.00

Margin = $\$7,355.50 / \$20,345 = 36.15\%$

12. 450 shares \times \$41 per share = \$18,450

Initial margin = $\$10,000 / \$18,450 = 54.20\%$

Assets Liabilities and account equity

450 shares \$18,450 Margin loan \$8,450

Account equity 10,000

Total \$18,450 Total \$18,450

CHAPTER 2 B-9

13. Total purchase = 400 shares × \$72 = \$28,800

Margin loan = \$28,800 – 15,000 = \$13,800

Margin call price = \$13,800 / [400 – (.30 × 400)] = \$49.29

To meet a margin call, you can deposit additional cash into your trading account, liquidate shares until your margin requirement is met, or deposit additional marketable securities against your account as collateral.

14. Interest on loan = \$13,800(1.065) – 13,800 = \$897

a. Proceeds from sale = 400(\$96) = \$38,400

Dollar return = \$38,400 – 15,000 – 13,800 – 897 = \$8,703

Rate of return = \$8,703 / \$15,000 = 58.02%

Without margin, rate of return = (\$96 – 72)/\$72 = 33.33%

b. Proceeds from sale = 400(\$72) = \$28,800

Dollar return = \$28,800 – 15,000 – 13,800 – 897 = –\$897

Rate of return = –\$897 / \$15,000 = –5.98%

Without margin, rate of return = \$0%

c. Proceeds from sale = 400(\$64) = \$25,600

Dollar return = \$25,600 – 15,000 – 13,800 – 897 = –\$4,097

Rate of return = –\$4,097 / \$15,000 = –27.31%

Without margin, rate of return = (\$64 – 72) / \$72 = –11.11%

15. Amount borrowed = (1,000 × \$46)(1 – .50) = \$23,000

Interest = \$23,000 × .0870 = \$2,001

Proceeds from sale = 1,000 × \$53 = \$53,000

Dollar return = \$53,000 – 23,000 – 23,000 – 2,001 = \$4,999

Rate of return = \$4,999 / \$23,000 = 21.73%

16. Total purchase = 800 × \$32 = \$25,600

Loan = \$25,600 – 15,000 = \$10,600

Interest = \$10,600 × .083 = \$879.80

Proceeds from sale = 800 × \$37 = \$29,600

Dividends = 800 × \$.64 = \$512

Dollar return = \$29,600 + 512 – 15,000 – 10,600 – 879.80 = \$3,632.20

Return = \$3,632.20 / \$15,000 = 24.21%

17. \$45,000 × (1.087)^{6/12} – 45,000 = \$1,916.68

18. \$32,000 × (1.069)^{2/12} – 32,000 = \$357.85

19. (1 + .15)^{12/7} – 1 = 27.07%

20. (1 + .15)^{12/5} – 1 = 39.85%

All else the same, the shorter the holding period, the larger the EAR.

21. Holding period return = (\$41 – 48 + .15) / \$48 = –14.27%

EAR = (1 – .1427)^{12/5} – 1 = –30.90%

B-10 SOLUTIONS

22. Initial purchase = 450 × \$41 = \$18,450

Amount borrowed = \$18,450 – 10,000 = \$8,450

Interest on loan = \$8,450(1 + .0725)^{1/2} – 8,450 = \$300.95

Dividends received = 450(\$.25) = \$112.50

Proceeds from stock sale = 450(\$46) = \$20,700

Dollar return = \$20,700 + 112.50 – 10,000 – 8,450 – 300.95 = \$2,061.55

Rate of return = \$2,061.55 / \$10,000 = 20.62 per six months

Effective annual return = (1 + .2062)² – 1 = 45.48%

23. Proceeds from sale = 2,000 × \$54 = \$108,000

Initial margin = \$108,000 × 1.00 = \$108,000

Assets Liabilities and account equity

Proceeds from sale \$108,000 Short position \$108,000
Initial margin deposit 108,000 Account equity 108,000
Total \$216,000 Total \$216,000

24. Proceeds from sale = $2,000 \times \$54 = \$108,000$

Initial margin = $\$108,000 \times .75 = \$81,000$

Assets Liabilities and account equity

Proceeds from sale \$108,000 Short position \$108,000

Initial margin deposit 81,000 Account equity 81,000

Total \$189,000 Total \$189,000

25. Proceeds from short sale = $1,200(\$86) = \$103,200$

Initial margin deposit = $\$103,200(.50) = \$51,600$

Total assets = Total liabilities and equity = $\$103,200 + 51,600 = \$154,800$

Cost of covering short = $1,200(\$73) = \$87,600$

Account equity = $\$154,800 - 87,600 = \$67,200$

Cost of covering dividends = $1,200(\$1.20) = \$1,440$

Dollar profit = $\$67,200 - 51,600 - 1,440 = \$14,160$

Rate of return = $\$14,160 / \$51,600 = 27.44\%$

CHAPTER 2 B-11

26. Proceeds from sale = $1,600 \times \$83 = \$132,800$

Initial margin = $\$132,800 \times .50 = \$66,400$

Initial Balance Sheet

Assets Liabilities and account equity

Proceeds from sale \$132,800 Short position \$132,800

Initial margin deposit 66,400 Account equity 66,400

Total \$199,200 Total \$199,200

Stock price = \$73

Assets Liabilities and account equity

Proceeds from sale \$132,800 Short position \$116,800

Initial margin deposit 66,400 Account equity 82,400

Total \$199,200 Total \$199,200

Margin = $\$82,400 / \$116,800 = 70.55\%$

Four-month return = $(\$82,400 - 66,400) / \$66,400 = 24.10\%$

Effective annual return = $(1 + .2410)^{12/5} - 1 = 67.89\%$

Stock price = \$93

Assets Liabilities and account equity

Proceeds from sale \$132,800 Short position \$148,800

Initial margin deposit 66,400 Account equity 50,400

Total \$199,200 Total \$199,200

Margin = $\$50,400 / \$148,800 = 33.87\%$

Four-month return = $(\$50,400 - 66,400) / \$66,400 = -24.10\%$

Effective annual return = $(1 - .2410)^{12/5} - 1 = -48.40\%$

Chapter 3

Overview of Security Types

Concept Questions

1. The two distinguishing characteristics are: (1) all money market instruments are debt instruments

(i.e., IOUs), and (2) all have less than 12 months to maturity when originally issued.

2. Preferred stockholders have a dividend preference and a liquidation preference. The dividend preference requires that preferred stockholders be paid before common stockholders. The liquidation

preference means that, in the event of liquidation, the preferred stockholders will receive a fixed face

value per share before the common stockholders receive anything.

3. The PE ratio is the price per share divided by annual earnings per share (EPS). EPS is the sum of the

most recent four quarters' earnings per share.

4. The current yield on a bond is very similar in concept to the dividend yield on common and preferred stock

5. Volume in stocks is quoted in round lots (multiples of 100). Volume in corporate bonds is the actual

number of bonds. Volume in options is reported in contracts; each contract represents the right to buy or sell 100 shares. Volume in futures contracts is reported in contracts, where each contract represents a fixed amount of the underlying asset.

6. You make or lose money on a futures contract when the *futures* price changes, not the current price

for immediate delivery (although the two are closely related).

7. Open interest is the number of outstanding contracts. Since most contract positions will be closed

before maturity, it will usually shrink as maturity approaches.

8. A futures contract is a contract to buy or sell an asset at some point in the future. Both parties in the

contract are legally obligated to fulfill their side of the contract. In an option contract, the buyer has

the right, but not the obligation, to buy (call) or sell (put) the asset. This option is not available to the

buyer of a futures contract. The seller of a futures or options contract have the same responsibility to

deliver the underlying asset. The difference is the seller of a future knows she must deliver the asset,

while the seller of an option contract is uncertain about delivery since delivery is at the option purchasers discretion.

9. A real asset is a tangible asset such as a land, buildings, precious metals, knowledge, etc. A financial

asset is a legal claim on a real asset. The two basic types of financial assets are primary assets and derivative asset. A primary asset is a direct claim on a real asset. A derivative asset is basically a claim (or potential claim) in a primary asset or even another derivative asset.

CHAPTER 3 B-13

10. Initially, it might seem that the put and the call would have the same price, but this is not correct. If

the strike price is exactly equal to the stock price, the call option must be worth more. Intuitively, there are two reasons. First, there is no limit to what you can make on the call, but your potential gain on the put is limited to \$100 per share. Second, we generally expect that the stock price will increase, so the odds are greater that the call option will be worth something at maturity.

Core Questions

1. Dividend yield = $.013 = \$0.30 / P_0$ thus $P_0 = \$0.30 / .013 = \23.08

Stock closed up \$.26, so yesterday's closing price = $\$23.08 - \$0.26 = \$22.82$

2,855 round lots of stock were traded.

2. PE = 16; EPS = $P_0 / 16 = \$23.08 / 16 = \1.44

EPS = NI / shares; so NI = $\$1.44(25,000,000) = \$36,057,692$

3. Dividend yield is 3.8%, so annualized dividend is $.038(\$84.12) = \3.20 . This is just four times the

last quarterly dividend, which is thus $\$3.20/4 = \$.80/\text{share}$.

4. $PE = 21$; $EPS = P_0 / 21 = \$84.12 / 21 = \4.01

5. The total par value of purchase = $4,000(\$1,000) = \$400,000$

Next payment = $(\$400,000 \times .084) / 2 = \$16,800$

Payment at maturity = $\$16,800 + 400,000 = \$416,800$

Remember, the coupon payment is based on the par value of the bond, not the price.

6. Contract to buy = $700 / 50 = 14$

Purchase price = $14 \times 50 \times \$860 = \$602,000$

$P = \$895$: Gain = $(\$895 - 860) \times 14 \times 50 = \$24,500$

$P = \$840$: Gain = $(\$840 - 860) \times 14 \times 50 = -\$14,000$

7. Cost of contracts = $\$3.20 \times 10 \times 100 = \$3,200$

If the stock price is $\$78.14$, the value is: $(\$78.14 - 70) \times 10 \times 100 = \$8,140$

Dollar return = $\$8,140 - 3,200 = \$4,940$

If the stock price is $\$67.56$, the call is worthless, so the dollar return is $-\$3,200$.

8. The stock is down 1.50%, so the price was $\$51.80/(1 - .015) = \52.59

9. Price = $(126.326/100)\$1,000 = \$1,263.26$

Current yield = Annual coupon payment / Price = $\$77 / \$1,263.26 = 6.10\%$

YTM of comparable Treasury = $5.768\% - 1.41\% = 4.358\%$

10. Next payment = $25(.0770/2)(\$1,000) = \962.50

Intermediate Questions

11. Open interest in the March contract is 64,967 contracts.

Since the standard contract size is 50,000 lbs., sell $400,000/50,000 = 8$ contracts.

You'll deliver $8(50,000) = 400,000$ pounds of cotton and receive $8(50,000)(\$0.4864) = \$194,560$.

B-14 SOLUTIONS

12. Trading volume yesterday in all open contracts was approximately 4,814.

The day before yesterday, 5,356 contracts were traded.

13. Initial value of position = $15(50,000)(\$5.345) = \$400,875$

Final value of position = $15(50,000)(\$5.794) = \$434,550$

Dollar profit = $\$434,550 - 400,875 = \$33,675$

14. Shares of GNR stock sell for $\$75.25$. The right to sell shares is a put option on the stock; the July put

with a strike price of $\$75$ closed at $\$1.65$. Since each stock option contract is for 100 shares of stock,

you're looking at $2,000/100 = 20$ option contracts. Thus, the cost of purchasing this right is $20(\$1.65)(100) = \$3,300$

15. The cheapest put contract (that traded on this particular day) is the June 65. The most expensive

option is the June 85. The first option is cheap because it has little time left to maturity and is not likely to be worth anything since the strike price is below the current market price. The latter option

is expensive because it has a relatively long time to maturity and the strike price is above the current stock price.

16. Case 1: Payoff = $\$75 - 71.85 = \$3.15/\text{share}$. Dollar return = $\$3.15(20)(100) - \$3,300 = \$3,000$

Return on investment per 3 months = $(\$3.15 - 1.65) / \$1.65 = 90.91\%$

Annualized return on investment = $(1 + .9091)^{12/3} - 1 = 1228.83\%$

Case 2: The option finishes worthless, so payoff = $\$0$. Dollar return = $-\$3,300$

Return on investment = -100% over all time periods.

17. The very first call option listed has a strike price of 10 and a quoted premium of \$5.50. This can't be right because you could buy an option for \$5.50 and immediately exercise it for another \$10. You can then sell the stock for its current price of \$20.25, earning a large, riskless profit. To prevent this kind of easy money, the option premium must be at least \$10.25. Similarly, the September 30 put is quoted at \$8.75. You could buy the put and immediately exercise it. The put premium must be at least \$9.75.

18. If you buy the stock, your \$20,000 will purchase five round lots, meaning 500 shares. A call contract costs \$400, so you can buy 50 of them. If, in six months, MMEE is selling for \$46, your stock will be worth $500 \text{ shares} \times \$46 = \$23,000$. Your dollar gain will be \$23,000 less the \$20,000 you invested, or \$3,000. Since you invested \$20,000, your return for the six-month period is $\$3,000/\$20,000 = 15\%$. To annualize your return, we need to compute the effective annual return, recognizing that there are two six-month periods in a year.

$$1 + \text{EAR} = 1.15_2 = 1.3225$$

$$\text{EAR} = .3225 \text{ or } 32.25\%$$

Your annualized return on the stock is 32.25%.

If MMEE is selling for \$35 per share, your loss on the stock investment is -12.50% , which annualizes as follows:

$$1 + \text{EAR} = .875_2 = .7656$$

$$\text{EAR} = -.2344 \text{ or } -23.44\%$$

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At the \$46 price, your call options are worth $\$46 - 40 = \6 each, but now you control 5,000 shares

(50 contracts), so your options are worth $5,000 \text{ shares} \times \$6 = \$30,000$ total. You invested \$20,000,

so your dollar return is $\$30,000 - 20,000 = \$10,000$, and your percentage return is $\$10,000/\$20,000$

$= 50\%$, compared to 32.25 on the stock investment. This annualizes to:

$$1 + \text{EAR} = 1.50_2 = 2.25$$

$$\text{EAR} = 1.25 \text{ or } 125\%$$

However, if MMEE is selling for \$35 when your options mature, then you lose everything (\$20,000

investment), and your return is -100% .

19. You only get the dividend if you own the stock. The dividend would increase the return on your

stock investment by the amount of the dividend yield, $\$.50/\$40 = .0125$, or 1.25%, but it would have

no effect on your option investment. This question illustrates that an important difference between

owning the stock and the option is that you only get the dividend if you own the stock.

20. At the \$36.40 stock price, your put options are worth $\$40 - 36.40 = \3.60 each. The premium was

\$2.50, so you bought 80 contracts, meaning you control 8,000 shares. Your options are worth 8,000

shares $\times \$3.60 = \$28,800$ total. You invested \$20,000, so your dollar return is $\$28,800 - 20,000 = \$8,800$, and your percentage return is $\$8,800/\$20,000 = 44\%$. This annualizes to:

$$1 + \text{EAR} = 1.44_2 = 2.0736$$

EAR = 1.0736 or 107.36%

Chapter 4 Mutual Funds

Concept Questions

1. Mutual funds are owned by fund shareholders. A fund is run by the fund manager, who is hired by the fund's directors. The fund's directors are elected by the shareholders.
2. A rational investor might pay a load because he or she desires a particular type of fund or fund manager for which a no-load alternative does not exist. More generally, some investors feel you get what you pay for and are willing to pay more. Whether they are correct or not is a matter of some debate. Other investors simply are not aware of the full range of alternatives.
3. The NAV of a money market mutual fund is never *supposed* to change; it is supposed to stay at a constant \$1. It never rises; only in very rare instances does it fall. Maintaining a constant NAV is possible by simply increasing the number of shares as needed such that the number of shares is always equal to the total dollar value of the fund.
4. A money market deposit account is essentially a bank savings account. A money market mutual fund is a true mutual fund. A bank deposit is insured by the FDIC, so it is safer, at least up to the maximum insured amount.
5. If your investment horizon is only one year, you probably should not invest in the fund. In this case, the fund return has to be greater than five percent just to make back your original investment. Over a twenty-year horizon, you have more time to make up the initial load. The longer the investment horizon, the better chance you have of regaining the amount paid in a front-end load.
6. In an up market, the cash balance will reduce the overall return since the fund is partly invested in assets with a lower return. In a down market, a cash balance should help reduce the negative returns from stocks or other instruments. An open-end fund typically keeps a cash balance to meet shareholder redemptions. A closed-end fund does not have shareholder redemptions so very little cash, if any, is kept in the portfolio.
7. 12b-1 fees are designed to pay for marketing and distribution costs. It does not really make sense that a closed-end fund charges 12b-1 fees because there is no need to market the fund once it has been sold at the IPO and there are no distributions necessary for the fund since the shares are sold on the secondary market.
8. You should probably buy an open-end fund because the fund stands ready to buy back shares at NAV. With a closed-end fund another buyer must make the purchase, so it may be more difficult to sell at NAV. We should note that an open-end fund may have the right to delay redemption if it so chooses.
9. Funds that accumulate a long record of poor performance tend to not attract investors. They are often simply merged into other funds. This is a type of survivor bias, meaning that a mutual fund family's

typical long-term track record may look pretty good, but only because the poor performing funds did

not survive. In fact, several hundred funds disappear each year.

CHAPTER 4 B-17

10. It doesn't matter! For example, suppose we have a fund with a NAV of \$100, a two percent fee, and a 10 percent annual return. If the fee is charged up front, we will have \$98 invested, so at the end of the year, it will grow to \$107.80. If the fee is charged at the end of the year, the initial investment of \$100 will grow to \$110. When the two percent fee is taken out, we will be left with \$107.80, the same amount we would have if the fee was charged up front.

Core Questions

NOTE: All end of chapter problems were solved using a spreadsheet. Many problems require multiple steps. Due to space and readability constraints, when these intermediate steps are included in this solutions manual, rounding may appear to have occurred. However, the final answer for each problem is found without rounding during any step in the problem.

1. $NAV = \$4,500,000,000 / 130,000,000 = \34.62

2. $Load = (\$36.10 - 34.62) / \$36.10 = 4.11\%$

3. $NAV = \$48.65(1 - .015) = \47.92 ; Market value of assets = $\$47.92(13,400,000) = \$642,128,000$

4. Initial shares = 15,000. Final shares = $15,000(1.046) = 15,690$, and final NAV = \$1 because this is a money market fund.

5. Total assets = $(4,000 \times \$68) + (9,000 \times \$32) + (6,500 \times \$44) + (8,400 \times \$56) = \$1,316,400$
 $NAV = \$1,316,400 / 50,000 = \26.33

6. $NAV = (\$1,316,400 - 75,000) / 50,000 = \24.83

7. Offering price = $\$24.83 / (1 - .05) = \26.14

8. $\$68,000,000 / \$120,000,000 = 56.67\%$

9. $NAV = (\$350,000,000 - 800,000) / 20,000,000 = \17.46
 $(\$15.27 - 17.46) / \$17.46 = -12.54\%$

10. $(\$43.51 - 41.86 + 0.34 + 1.25) / \$41.86 = 7.74\%$

Intermediate

11. Turnover = $X / \$2,700,000,000 = .47$; $X = \$1,269,000,000$. This is less than the \$1.45 billion in sales,

so this is the number used in the calculation of turnover in this case.

12. Management fee = $.0085(\$2,700,000,000) = \$22,950,000$

Miscellaneous and administrative expenses = $(.0125 - .0085)\$2,700,000,000 = \$10,800,000$

13. Initial NAV = $\$41.20(1 - .05) = \39.14

Final NAV = $\$39.14[1 + (.12 - .0165)] = \43.19

Sale proceeds per share = $\$43.19(1 - .02) = \42.33

Total return = $(\$42.33 - 41.20) / \$41.20 = 2.74\%$

You earned 2.74% even though the fund's investments grew by 12%! The various fees and loads sharply reduced your return.

B-18 SOLUTIONS

Note, there is another interpretation of the solution. To calculate the final NAV including fees, we would first find the final NAV excluding fees with a 12 percent return, which would be:

$NAV \text{ excluding fees} = \$39.14(1 + .12) = \$43.84$

Now, we can find the final NAV after the fees, which would be:

$$\text{Final NAV} = \$43.84(1 - .0165) = \$43.11$$

Notice this answer is \$0.08 different than our original calculation. The reason is the assumption behind the fee withdrawal. The second calculation assumes the fees are withdrawn entirely at the end

of the year, which is generally not true. Generally, fees are withdrawn periodically throughout the year, often quarterly. The actual relationship between the return on the underlying assets, the fees charged, and the actual return earned is the same as the Fisher equation, which shows the relationship

between the inflation, the nominal interest rate, and the real interest rate. In this case, we can write the relationship as:

$$(1 + \text{Return on underlying assets}) = (1 + \text{Fees})(1 + \text{Return earned})$$

As with the Fisher equation, effective annual rates must be used. So, we would need to know the periodic fee withdrawal and the number of fee assessments during the year to find the exact final NAV. Our first calculation is analogous to the approximation of the Fisher equation, hence it is the

method of calculation we will use going forward, that is:

$$\text{Return earned} = \text{Return on underlying assets} - \text{Fees}$$

Assuming a small fee (which we hope the mutual fund would have), the answer will be closest to the actual value without undue calculations.

14. Initial NAV = \$41.20; Final NAV = $\$41.20[1 + (.12 - .0095)] = \$45.75 = \text{Sale proceeds}$

$$\text{Total return} = (\$45.75 - 41.20)/\$41.20 = 11.05\%$$

15. The OTC Portfolio (“OTC”) is classified as XG, which is multi-cap growth. Its one-year return is

-26.9%, which is good for a B rating. This places the fund in the top 20 to 40 percent.

16. The highest load is a substantial 8.24 percent.

17. Of the funds listed, the one with the lowest costs (in terms of expense ratios) is the “Four-in-One”

Fund. That’s a little misleading, however, because this fund actually is a “fund of funds,” meaning

that it invests in other mutual funds (in this case, four of them). The highest cost funds tend to be more internationally oriented.

18. This fund has a 3% load and a NAV of \$7.16. The offer price, which is what you would pay, is

$$\$7.16/(1 - .03) = \$7.38, \text{ so } 1,000 \text{ shares would cost } \$7,380.$$

19. Since we are concerned with the annual return, the initial dollar investment is irrelevant, so we will

calculate the return based on a one dollar investment.

$$1 \text{ year: } [\$0.95(1 + .12)]^{1/1} - 1 = 6.40\%$$

$$2 \text{ years: } [\$0.95(1 + .12)]^{2/2} - 1 = 9.16\%$$

$$5 \text{ years: } [\$0.95(1 + .12)]^{5/5} - 1 = 10.86\%$$

$$10 \text{ years: } [\$0.95(1 + .12)]^{10/10} - 1 = 11.43\%$$

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$$20 \text{ years: } [\$0.95(1 + .12)]^{20/20} - 1 = 11.71\%$$

$$50 \text{ years: } [\$0.95(1 + .12)]^{50/50} - 1 = 11.89\%$$

20. After 3 years: (For every dollar invested)

$$\text{Class A: } \$0.9425(1 + .11 - .0023 - .0073)^3 = \$1.25584$$

$$\text{Class B: } [\$1.00(1 + .11 - .01 - .0073)]^3(1 - .02) = \$1.27858$$

After 20 years:

$$\text{Class A: } \$0.9425(1 + .11 - .0023 - .0073)^{20} = \$6.38694$$

Class B: $\$1.00(1 + .11 - .01 - .0073)_3 = \5.88869

21. $(1 + .04 - .002)_2 = (1 - .05)(1 + R - .0140)_2$; $1.07744 = 0.95(1 + R - .0140)_2$; $R = 7.90\%$

$(1 + .04 - .002)_{10} = (1 - .05)(1 + R - .0140)_{10}$; $1.45202 = 0.95(1 + R - .0140)_{10}$; $R = 5.73\%$

22. National municipal fund: after-tax yield = $.039(1 - .08) = 3.59\%$

Taxable fund: after-tax yield = $.061(1 - .35 - .08) = 3.48\%$

New Jersey municipal fund: after-tax yield = 3.60%

Choose the New Jersey fund.

23. Municipal fund: after-tax yield = 3.90%

Taxable fund: after-tax yield = $.061(1 - .35) = 3.97\%$

New Jersey municipal fund: after-tax yield = 3.60%

Choose the taxable fund.

24. $(\$18.43 - \text{NAV})/\text{NAV} = -.128$; $\text{NAV} = \$21.14$

Shares outstanding = $\$360\text{M}/\$21.14 = 17,029,328$

For closed-end funds, the total shares outstanding are fixed, just as with common stock (assuming no

net repurchases by the fund or new share issues to the public).

25. $\text{NAV at IPO} = \$25(1 - .08) = \23.00

$(P - \$23.00)/\$23.00 = -.10$ so $P = \$20.70$

The value of your investment is $5,000(\$20.70) = \$103,500$, a loss of $\$21,500$ in one day.