

CHAPTER 3: HOW SECURITIES ARE TRADED

PROBLEM SETS

1. Answers to this problem will vary.
2. The dealer sets the bid and asked price. Spreads should be higher on inactively traded stocks and lower on actively traded stocks.
3.
 - a. In principle, potential losses are unbounded, growing directly with increases in the price of IBM.
 - b. If the stop-buy order can be filled at \$128, the maximum possible loss per share is \$8, or \$800 total. If the price of IBM shares goes above \$128, then the stop-buy order would be executed, limiting the losses from the short sale.
4. (a) A market order is an order to execute the trade immediately at the best possible price. The emphasis in a market order is the speed of execution (the reduction of execution uncertainty). The disadvantage of a market order is that the price it will be executed at is not known ahead of time; it thus has price uncertainty.
5. (a) The advantage of an Electronic Crossing Network (ECN) is that it can execute large block orders without affecting the public quote. Since this security is illiquid, large block orders are less likely to occur and thus it would not likely trade through an ECN.

Electronic Limit-Order Markets (ELOM) transact securities with high trading volume. This illiquid security is unlikely to be traded on an ELOM.

6.
 - a. The stock is purchased for: $300 \times \$40 = \$12,000$
The amount borrowed is \$4,000. Therefore, the investor put up equity, or margin, of \$8,000.
 - b. If the share price falls to \$30, then the value of the stock falls to \$9,000. By the end of the year, the amount of the loan owed to the broker grows to:
$$\$4,000 \times 1.08 = \$4,320$$

Therefore, the remaining margin in the investor's account is:
$$\$9,000 - \$4,320 = \$4,680$$

The percentage margin is now: $\$4,680 / \$9,000 = 0.52 = 52\%$

Therefore, the investor will not receive a margin call.

- c. The rate of return on the investment over the year is:

$$\begin{aligned} & (\text{Ending equity in the account} - \text{Initial equity}) / \text{Initial equity} \\ & = (\$4,680 - \$8,000) / \$8,000 = -0.415 = -41.5\% \end{aligned}$$

7. a. The initial margin was: $0.50 \times 1,000 \times \$40 = \$20,000$

As a result of the increase in the stock price Old Economy Traders loses:

$$\$10 \times 1,000 = \$10,000$$

Therefore, margin decreases by \$10,000. Moreover, Old Economy Traders must pay the dividend of \$2 per share to the lender of the shares, so that the margin in the account decreases by an additional \$2,000. Therefore, the remaining margin is:

$$\$20,000 - \$10,000 - \$2,000 = \$8,000$$

- b. The percentage margin is: $\$8,000 / \$50,000 = 0.16 = 16\%$

So there will be a margin call.

- c. The equity in the account decreased from \$20,000 to \$8,000 in one year, for a rate of return of: $(-\$12,000 / \$20,000) = -0.60 = -60\%$

8. a. The buy order will be filled at the best limit-sell order price: \$50.25

- b. The next market buy order will be filled at the next-best limit-sell order price: \$51.50

- c. You would want to increase your inventory. There is considerable buying demand at prices just below \$50, indicating that downside risk is limited. In contrast, limit sell orders are sparse, indicating that a moderate buy order could result in a substantial price increase.

9. a. You buy 200 shares of Telecom for \$10,000. These shares increase in value by 10%, or \$1,000. You pay interest of: $0.08 \times \$5,000 = \400

$$\text{The rate of return will be: } \frac{\$1,000 - \$400}{\$5,000} = 0.12 = 12\%$$

- b. The value of the 200 shares is $200P$. Equity is $(200P - \$5,000)$. You will receive a margin call when:

$$\frac{200P - \$5,000}{200P} = 0.30 \Rightarrow \text{when } P = \$35.71 \text{ or lower}$$

10. a. Initial margin is 50% of \$5,000 or \$2,500.
- b. Total assets are \$7,500 (\$5,000 from the sale of the stock and \$2,500 put up for margin). Liabilities are 100P. Therefore, equity is (\$7,500 – 100P). A margin call will be issued when:

$$\frac{\$7,500 - 100 P}{100 P} = 0.30 \Rightarrow \text{when } P = \$57.69 \text{ or higher}$$

11. The total cost of the purchase is: $\$40 \times 500 = \$20,000$

You borrow \$5,000 from your broker, and invest \$15,000 of your own funds. Your margin account starts out with equity of \$15,000.

- a. (i) Equity increases to: $(\$44 \times 500) - \$5,000 = \$17,000$
 Percentage gain = $\$2,000/\$15,000 = 0.1333 = 13.33\%$
- (ii) With price unchanged, equity is unchanged.
 Percentage gain = zero
- (iii) Equity falls to $(\$36 \times 500) - \$5,000 = \$13,000$
 Percentage gain = $(-\$2,000/\$15,000) = -0.1333 = -13.33\%$

The relationship between the percentage return and the percentage change in the price of the stock is given by:

$$\% \text{ return} = \% \text{ change in price} \times \frac{\text{Total investment}}{\text{Investor's initial equity}} = \% \text{ change in price} \times 1.333$$

For example, when the stock price rises from \$40 to \$44, the percentage change in price is 10%, while the percentage gain for the investor is:

$$\% \text{ return} = 10\% \times \frac{\$20,000}{\$15,000} = 13.33\%$$

- b. The value of the 500 shares is 500P. Equity is (500P – \$5,000). You will receive a margin call when:

$$\frac{500 P - \$5,000}{500 P} = 0.25 \Rightarrow \text{when } P = \$13.33 \text{ or lower}$$

- c. The value of the 500 shares is 500P. But now you have borrowed \$10,000 instead of \$5,000. Therefore, equity is (500P – \$10,000). You will receive a margin call when:

$$\frac{500 P - \$10,000}{500 P} = 0.25 \Rightarrow \text{when } P = \$26.67 \text{ or lower}$$

With less equity in the account, you are far more vulnerable to a margin call.

- d. By the end of the year, the amount of the loan owed to the broker grows to:

$$\$5,000 \times 1.08 = \$5,400$$

The equity in your account is $(500P - \$5,400)$. Initial equity was \$15,000. Therefore, your rate of return after one year is as follows:

$$(i) \quad \frac{(500 \times \$44) - \$5,400 - \$15,000}{\$15,000} = 0.1067 = 10.67\%$$

$$(ii) \quad \frac{(500 \times \$40) - \$5,400 - \$15,000}{\$15,000} = -0.0267 = -2.67\%$$

$$(iii) \quad \frac{(500 \times \$36) - \$5,400 - \$15,000}{\$15,000} = -0.1600 = -16.00\%$$

The relationship between the percentage return and the percentage change in the price of Intel is given by:

$$\% \text{ return} = \left(\% \text{ change in price} \times \frac{\text{Total investment}}{\text{Investor's initial equity}} \right) - \left(8\% \times \frac{\text{Funds borrowed}}{\text{Investor's initial equity}} \right)$$

For example, when the stock price rises from \$40 to \$44, the percentage change in price is 10%, while the percentage gain for the investor is:

$$\left(10\% \times \frac{\$20,000}{\$15,000} \right) - \left(8\% \times \frac{\$5,000}{\$15,000} \right) = 10.67\%$$

- e. The value of the 500 shares is $500P$. Equity is $(500P - \$5,400)$. You will receive a margin call when:

$$\frac{500P - \$5,400}{500P} = 0.25 \Rightarrow \text{when } P = \$14.40 \text{ or lower}$$

12. a. The gain or loss on the short position is: $(-500 \times \Delta P)$
Invested funds = \$15,000

Therefore: rate of return = $(-500 \times \Delta P)/15,000$

The rate of return in each of the three scenarios is:

$$(i) \quad \text{rate of return} = (-500 \times \$4)/\$15,000 = -0.1333 = -13.33\%$$

$$(ii) \quad \text{rate of return} = (-500 \times \$0)/\$15,000 = 0\%$$

$$(iii) \quad \text{rate of return} = [-500 \times (-\$4)]/\$15,000 = +0.1333 = +13.33\%$$

- b. Total assets in the margin account equal:

\$20,000 (from the sale of the stock) + \$15,000 (the initial margin) = \$35,000

Liabilities are 500P. You will receive a margin call when:

$$\frac{\$35,000 - 500P}{500P} = 0.25 \Rightarrow \text{when } P = \$56 \text{ or higher}$$

- c. With a \$1 dividend, the short position must now pay on the borrowed shares: (\$1/share × 500 shares) = \$500. Rate of return is now:

$$[(-500 \times \Delta P) - 500]/15,000$$

(i) rate of return = $[(-500 \times \$4) - \$500]/\$15,000 = -0.1667 = -16.67\%$

(ii) rate of return = $[(-500 \times \$0) - \$500]/\$15,000 = -0.0333 = -3.33\%$

(iii) rate of return = $[(-500) \times (-\$4) - \$500]/\$15,000 = +0.1000 = +10.00\%$

Total assets are \$35,000, and liabilities are (500P + 500). A margin call will be issued when:

$$\frac{35,000 - 500P - 500}{500P} = 0.25 \Rightarrow \text{when } P = \$55.20 \text{ or higher}$$

13. The broker is instructed to attempt to sell your Marriott stock as soon as the Marriott stock trades at a bid price of \$20 or less. Here, the broker will attempt to execute, but may not be able to sell at \$20, since the bid price is now \$19.95. The price at which you sell may be more or less than \$20 because the stop-loss becomes a market order to sell at current market prices.
14. a. \$55.50
- b. \$55.25
- c. The trade will not be executed because the bid price is lower than the price specified in the limit sell order.
- d. The trade will not be executed because the asked price is greater than the price specified in the limit buy order.
15. a. In an exchange market, there can be price improvement in the two market orders. Brokers for each of the market orders (i.e., the buy order and the sell order) can agree to execute a trade inside the quoted spread. For example, they can trade at \$55.37, thus improving the price for both customers by \$0.12 or \$0.13 relative to the quoted bid and asked prices. The buyer gets the stock for \$0.13 less than the quoted asked price, and the seller receives \$0.12 more for the stock than the quoted bid price.
- b. Whereas the limit order to buy at \$55.37 would not be executed in a dealer market (since the asked price is \$55.50), it could be executed in an exchange market. A broker for another customer with an order to sell at market would view the limit buy order as the best bid price; the two brokers could agree to the trade and bring it to the specialist, who would then execute the trade.

16. a. You will not receive a margin call. You borrowed \$20,000 and with another \$20,000 of your own equity you bought 1,000 shares of Disney at \$40 per share. At \$35 per share, the market value of the stock is \$35,000, your equity is \$15,000, and the percentage margin is:
 $\$15,000/\$35,000 = 42.9\%$
 Your percentage margin exceeds the required maintenance margin.

- b. You will receive a margin call when:

$$\frac{1,000 P - \$20,000}{1,000 P} = 0.35 \Rightarrow \text{when } P = \$30.77 \text{ or lower}$$

17. The proceeds from the short sale (net of commission) were: $(\$21 \times 100) - \$50 = \$2,050$

A dividend payment of \$200 was withdrawn from the account.

Covering the short sale at \$15 per share costs (with commission): $\$1,500 + \$50 = \$1,550$

Therefore, the value of your account is equal to the net profit on the transaction:

$$\$2,050 - \$200 - \$1,550 = \$300$$

Note that your profit (\$300) equals $(100 \text{ shares} \times \text{profit per share of } \$3)$. Your net proceeds per share was:

\$21	selling price of stock
-\$15	repurchase price of stock
-\$ 2	dividend per share
<u>-\$ 1</u>	2 trades \times \$0.50 commission per share
\$ 3	