
CHAPTER 29

MERGERS AND ACQUISITIONS

Answers to Concepts Review and Critical Thinking Questions

1. In the purchase method, assets are recorded at market value, and goodwill is created to account for the excess of the purchase price over this recorded value. In the pooling of interests method, the balance sheets of the two firms are simply combined; no goodwill is created. The choice of accounting method has no direct impact on the cash flows of the firms. EPS will probably be lower under the purchase method because reported income is usually lower due to the required amortization of the goodwill created in the purchase.
2.
 - a. False. Although the reasoning seems correct, in general, the new firms do not have monopoly power. This is especially true since many countries have laws limiting mergers when it would create a monopoly.
 - b. True. When managers act in their own interest, acquisitions are an important control device for shareholders. It appears that some acquisitions and takeovers are the consequence of underlying conflicts between managers and shareholders.
 - c. False. Even if markets are efficient, the presence of synergy will make the value of the combined firm different from the sum of the values of the separate firms. Incremental cash flows provide the positive NPV of the transaction.
 - d. False. In an efficient market, traders will value takeovers based on “fundamental factors” regardless of the time horizon. Recall that the evidence as a whole suggests efficiency in the markets. Mergers should be no different.
 - e. False. The tax effect of an acquisition depends on whether the merger is taxable or non-taxable. In a taxable merger, there are two opposing factors to consider, the capital gains effect and the write-up effect. The net effect is the sum of these two effects.
 - f. True. Because of the coinsurance effect, wealth might be transferred from the stockholders to the bondholders. Acquisition analysis usually disregards this effect and considers only the total value.
3. Diversification doesn’t create value in and of itself because diversification reduces unsystematic, not systematic, risk. As discussed in the chapter on options, there is a more subtle issue as well. Reducing unsystematic risk benefits bondholders by making default less likely. However, if a merger is done purely to diversify (i.e., no operating synergy), then the NPV of the merger is zero. If the NPV is zero, and the bondholders are better off, then stockholders must be worse off.
4. A firm might choose to split up because the newer, smaller firms may be better able to focus on their particular markets. Thus, reverse synergy is a possibility. An added advantage is that performance evaluation becomes much easier once the split is made because the new firm’s financial results (and stock prices) are no longer commingled.

5. It depends on how they are used. If they are used to protect management, then they are not good for stockholders. If they are used by management to negotiate the best possible terms of a merger, then they are good for stockholders.
6. One of the primary advantages of a taxable merger is the write-up in the basis of the target firm's assets, while one of the primary disadvantages is the capital gains tax that is payable. The situation is the reverse for a tax-free merger.

The basic determinant of tax status is whether or not the old stockholders will continue to participate in the new company, which is usually determined by whether they get any shares in the bidding firm. An LBO is usually taxable because the acquiring group pays off the current stockholders in full, usually in cash.

7. Economies of scale occur when average cost declines as output levels increase. A merger in this particular case might make sense because Eastern and Western may need less total capital investment to handle the peak power needs, thereby reducing average generation costs.
8. Among the defensive tactics often employed by management are seeking white knights, threatening to sell the crown jewels, appealing to regulatory agencies and the courts (if possible), and targeted share repurchases. Frequently, anti-takeover charter amendments are available as well, such as poison pills, poison puts, golden parachutes, lockup agreements, and supermajority amendments, but these require shareholder approval, so they can't be immediately used if time is short. While target firm shareholders may benefit from management actively fighting acquisition bids, in that it encourages higher bidding and may solicit bids from other parties as well, there is also the danger that such defensive tactics will discourage potential bidders from seeking the firm in the first place, which harms the shareholders.
9. In a cash offer, it almost surely does not make sense. In a stock offer, management may feel that one suitor is a better long-run investment than the other, but this is only valid if the market is not efficient. In general, the highest offer is the best one.
10. Various reasons include: (1) Anticipated gains may be smaller than thought; (2) Bidding firms are typically much larger, so any gains are spread thinly across shares; (3) Management may not be acting in the shareholders' best interest with many acquisitions; (4) Competition in the market for takeovers may force prices for target firms up to the zero NPV level; and (5) Market participants may have already discounted the gains from the merger before it is announced.

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.

Basic

1. For the merger to make economic sense, the acquirer must feel the acquisition will increase value by at least the amount of the premium over the market value, so:

$$\text{Minimum economic value} = \text{COP}740,000,000 - 640,000,000 = \text{COP}100,000,000$$

2. a) Since neither company has any debt, using the pooling method, the asset value of the combined must equal the value of the equity, so:

$$\text{Assets} = \text{Equity} = 20,000(\text{£}20) + 20,000(\text{£}7) = \text{£}540,000$$

- b) With the purchase method, the assets of the combined firm will be the book value of Firm X, the acquiring company, plus the market value of Firm Y, the target company, so:

$$\text{Assets from X} = 20,000(\text{£}20) = \text{£}400,000 \text{ (book value)}$$

$$\text{Assets from Y} = 20,000(\text{£}18) = \text{£}360,000 \text{ (market value)}$$

The purchase price of Firm Y is the number of shares outstanding times the sum of the current stock price per share plus the premium per share, so:

$$\text{Purchase price of Y} = 20,000(\text{£}18 + 5) = \text{£}460,000$$

The goodwill created will be:

$$\text{Goodwill} = \text{£}460,000 - 360,000 = \text{£}100,000.$$

And the total asset of the combined company will be:

$$\text{Total assets XY} = \text{Total equity XY} = \text{£}400,000 + 360,000 + 100,000 = \text{£}860,000$$

3. In the pooling method, all accounts of both companies are added together to total the accounts in the new company, so the post-merger balance sheet will be:

<i>Las Tunas Dykes, post-merger</i>			
Current assets	CUP13,400	Current liabilities	CUP 4,700
Fixed assets	19,600	Long-term debt	2,800
		Equity	25,500
Total	<u>CUP33,000</u>		<u>CUP33,000</u>

4. Since the acquisition is funded by long-term debt, the post-merger balance sheet will have long-term debt equal to the original long-term debt of Las Tunas' balance sheet plus the new long-term debt issue, so:

$$\text{Post-merger long-term debt} = \text{CUP}1,900 + 17,000 = \text{CUP}18,900$$

Goodwill will be created since the acquisition price is greater than the market value. The goodwill amount is equal to the purchase price minus the market value of assets. Generally, the market value of current assets is equal to the book value, so:

$$\text{Goodwill created} = \text{CUP}17,000 - \text{CUP}12,000 \text{ (market value FA)} - \text{CUP}3,400 \text{ (market value CA)} = \text{CUP}1,600$$

Current liabilities and equity will remain the same as the pre-merger balance sheet of the acquiring firm. Current assets will be the sum of the two firm's pre-merger balance sheet accounts, and the

fixed assets will be the sum of the pre-merger fixed assets of the acquirer and the market value of fixed assets of the target firm. The post-merger balance sheet will be:

<i>Las Tunas Dykes, post-merger</i>			
Current assets	CUP13,400	Current liabilities	CUP 3,100
Fixed assets	26,000	Long-term debt	18,900
Goodwill	<u>1,600</u>	Equity	<u>19,000</u>
Total	<u>CUP41,000</u>		<u>CUP41,000</u>

5. In the pooling method, all accounts of both companies are added together to total the accounts in the new company, so the post-merger balance sheet will be:

<i>Silver Enterprises, post-merger</i>			
	YER 3,700	Current liabilities	YER 2,700
900 Other assets	1,150	Long-term debt	
Net fixed assets	<u>6,700</u>	Equity	<u>7,950</u>
Total	<u>YER11,550</u>		<u>YER11,550</u>

6. Since the acquisition is funded by long-term debt, the post-merger balance sheet will have long-term debt equal to the original long-term debt of Silver's balance sheet plus the new long-term debt issue, so:

$$\text{Post-merger long-term debt} = \text{YER}900 + 8,400 = \text{YER}9,300$$

Goodwill will be created since the acquisition price is greater than the market value. The goodwill amount is equal to the purchase price minus the market value of assets. Since the market value of fixed assets of the target firm is equal to the book value, and the book value of all other assets is equal to market value, we can subtract the total assets from the purchase price, so:

$$\text{Goodwill created} = \text{YER}8,400 - (\text{YER}4,250 \text{ market value TA}) = \text{YER}4,150$$

Current liabilities and equity will remain the same as the pre-merger balance sheet of the acquiring firm. Current assets and other assets will be the sum of the two firm's pre-merger balance sheet accounts, and the fixed assets will be the sum of the pre-merger fixed assets of the acquirer and the market value of fixed assets of the target firm. Note, in this case, the market value and the book value of fixed assets are the same. The post-merger balance sheet will be:

<i>Silver Enterprises, post-merger</i>			
	YER 3,700	Current liabilities	YER 1,800
9,300 Other assets	1,150	Long-term debt	
Net fixed assets	6,700	Equity	4,600
Goodwill	<u>4,150</u>		
Total	<u>YER15,700</u>		<u>YER15,700</u>

7. a. The cash cost is the amount of cash offered, so the cash cost is ¥94 million.

To calculate the cost of the stock offer, we first need to calculate the value of the target to the acquirer. The value of the target firm to the acquiring firm will be the market value of the target plus the PV of the incremental cash flows generated by the target firm. The cash flows are a perpetuity, so

$$V^* = ¥78,000,000 + ¥3,100,000/.10 = ¥109,000,000$$

The cost of the stock offer is the percentage of the acquiring firm given up times the sum of the market value of the acquiring firm and the value of the target firm to the acquiring firm. So, the equity cost will be:

$$\text{Equity cost} = .40(¥135\text{M} + 109,000,000) = ¥97,600,000$$

- b. The NPV of each offer is the value of the target firm to the acquiring firm minus the cost of acquisition, so:

$$\text{NPV cash} = ¥109,000,000 - 94,000,000 = ¥15,000,000$$

$$\text{NPV stock} = ¥109,000,000 - 97,600,000 = ¥11,400,000$$

- c. Since the NPV is greater with the cash offer, the acquisition should be in cash.

8. a. The EPS of the combined company will be the sum of the earnings of both companies divided by the shares in the combined company. Since the stock offer is one share of the acquiring firm for three shares of the target firm, new shares in the acquiring firm will increase by one-third. So, the new EPS will be:

$$\text{EPS} = (\text{€}300,000 + 675,000)/[180,000 + (1/3)(60,000)] = \text{€}4.875$$

The market price of Stultz will remain unchanged if it is a zero NPV acquisition. Using the PE ratio, we find the current market price of Stultz stock, which is:

$$P = 21(\text{€}675,000)/180,000 = \text{€}78.75$$

If the acquisition has a zero NPV, the stock price should remain unchanged. Therefore, the new PE will be:

$$P/E = \text{€}78.75/\text{€}4.875 = 16.15$$

- b. The value of Flannery to Stultz must be the market value of the company since the NPV of the acquisition is zero. Therefore, the value is:

$$V^* = \text{€}300,000(5.25) = \text{€}1,575,000$$

The cost of the acquisition is the number of shares offered times the share price, so the cost is:

$$\text{Cost} = (1/3)(60,000)(€78.75) = €1,575,000$$

So, the NPV of the acquisition is:

$$\begin{aligned} \text{NPV} &= 0 = V^* + \Delta V - \text{Cost} = €1,575,000 + \Delta V - 1,575,000 \\ \Delta V &= €0 \end{aligned}$$

Although there is no economic value to the takeover, it is possible that Stultz is motivated to purchase Flannery for other than financial reasons.

9. The decision hinges upon the risk of surviving. That is, consider the wealth transfer from bondholders to stockholders when risky projects are undertaken. High-risk projects will reduce the expected value of the bondholders' claims on the firm. The telecommunications business is riskier than the utilities business.

If the total value of the firm does not change, the increase in risk should favor the stockholder. Hence, management should approve this transaction.

If the total value of the firm drops because of the transaction, and the wealth effect is lower than the reduction in total value, management should reject the project.

10. a. The NPV of the merger is the market value of the target firm, plus the value of the synergy, minus the acquisition costs, so:

$$\text{NPV} = 900(£24) + £3,000 - 900(£27) = £300$$

- b. Since the NPV goes directly to stockholders, the share price of the merged firm will be the market value of the acquiring firm plus the NPV of the acquisition, divided by the number of shares outstanding, so:

$$\text{Share price} = [1,500(£34) + £300]/1,500 = £34.20$$

- c. The merger premium is the premium per share times the number of shares of the target firm outstanding, so the merger premium is:

$$\text{Merger premium} = 900(£27 - 24) = £2,700$$

- d. The number of new shares will be the number of shares of the target times the exchange ratio, so:

$$\text{New shares created} = 900(3/5) = 540 \text{ new shares}$$

The value of the merged firm will be the market value of the acquirer plus the market value of the target plus the synergy benefits, so:

$$V_{BT} = 1,500(£34) + 900(£24) + 3,000 = £75,600$$

The price per share of the merged firm will be the value of the merged firm divided by the total shares of the new firm, which is:

$$P = £75,600 / (1,500 + 540) = £37.06$$

- e. The NPV of the acquisition using a share exchange is the market value of the target firm plus synergy benefits, minus the cost. The cost is the value per share of the merged firm times the number of shares offered to the target firm shareholders, so:

$$NPV = 900(£24) + £3,000 - 540(£37.06) = £4,588.24$$

Intermediate

11. The cash offer is better for target firm shareholders since they receive £27 per share. In the share offer, the target firm's shareholders will receive:

$$\text{Equity offer value} = (3/5)(£24) = £14.40 \text{ per share}$$

The shareholders of the target firm would prefer the cash offer. The exchange ratio which would make the target firm shareholders indifferent between the two offers is the cash offer price divided by the new share price of the firm under the cash offer scenario, so:

$$\text{Exchange ratio} = £27 / £34.20 = .7895$$

12. The cost of the acquisition is:

$$\text{Cost} = 220(\text{kr}20) = \text{kr}4,400$$

Since the stock price of the acquiring firm is kr40, the firm will have to give up:

$$\text{Shares offered} = \text{kr}4,400 / \text{kr}40 = 110 \text{ shares}$$

- a. The EPS of the merged firm will be the combined EPS of the existing firms divided by the new shares outstanding, so:

$$\text{EPS} = (\text{kr}900 + 600) / (550 + 110) = \text{kr}2.27$$

- b. The PE of the acquiring firm is:

$$\text{Original P/E} = \text{kr}40 / (\text{kr}900 / 550) = 24.44 \text{ times}$$

Assuming the PE ratio does not change, the new stock price will be:

$$\text{New P} = \text{kr}2.27(24.44) = \text{kr}55.56$$

- c. If the market correctly analyzes the earnings, the stock price will remain unchanged since this is a zero NPV acquisition, so:

$$\text{New P/E} = \text{kr}40 / \text{kr}2.27 = 17.60 \text{ times}$$

- d. The new share price will be the combined market value of the two existing companies divided by the number of shares outstanding in the merged company. So:

$$P = [(550)(kr40) + 220(kr15)] / (550 + 110) = kr38.33$$

And the PE ratio of the merged company will be:

$$P/E = kr38.33 / kr2.27 = 16.87 \text{ times}$$

At the proposed bid price, this is a negative NPV acquisition for A since the share price declines. They should revise their bid downward until the NPV is zero.

13. Beginning with the fact that the NPV of a merger is the value of the target minus the cost, we get:

$$NPV = V_B^* - \text{Cost}$$

$$NPV = \Delta V + V_B - \text{Cost}$$

$$NPV = \Delta V - (\text{Cost} - V_B)$$

$$NPV = \Delta V - \text{Merger premium}$$

14. a. The synergy will be the present value of the incremental cash flows of the proposed purchase. Since the cash flows are perpetual, the synergy value is:

$$\text{Synergy value} = \text{K}600,000 / .08$$

$$\text{Synergy value} = \text{K}7,500,000$$

- b. The value of Flash-in-the-Pan to Fly-by-Night is the synergy plus the current market value of Flash-in-the-Pan, which is:

$$\text{Value} = \text{K}7,500,000 + 20,000,000$$

$$\text{Value} = \text{K}27,500,000$$

- c. The value of the cash option is the amount of cash paid, or $\text{K}25$ million. The value of the stock acquisition is the percentage of ownership in the merged company, times the value of the merged company, so:

$$\text{Stock acquisition value} = .25(\text{K}27,500,000 + 35,000,000)$$

$$\text{Stock acquisition value} = \text{K}15,625,000$$

- d. The NPV is the value of the acquisition minus the cost, so the NPV of each alternative is:

$$\text{NPV of cash offer} = \text{K}27,500,000 - 25,000,000$$

$$\text{NPV of cash offer} = \text{K}2,500,000$$

$$\text{NPV of stock offer} = \text{K}27,500,000 - 15,625,000$$

$$\text{NPV of stock offer} = \text{K}11,875,000$$

- e. The acquirer should make the stock offer since its NPV is greater.

15. a. The number of shares after the acquisition will be the current number of shares outstanding for the acquiring firm, plus the number of new shares created for the acquisition, which is:

$$\text{Number of shares after acquisition} = 30,000,000 + 15,000,000$$

$$\text{Number of shares after acquisition} = 45,000,000$$

And the share price will be the value of the combined company divided by the shares outstanding, which will be:

$$\text{New stock price} = \text{\pounds}1,000,000,000 / 45,000,000$$

$$\text{New stock price} = \text{\pounds}22.22$$

- b. Let α equal the fraction of ownership for the target shareholders in the new firm. We can set the percentage of ownership in the new firm equal to the value of the cash offer, so:

$$\alpha(\text{\pounds}1,000,000,000) = \text{\pounds}280,000,000$$

$$\alpha = .28 \text{ or } 28\%$$

So, the shareholders of the target firm would be equally as well off if they received 28 percent of the stock in the new company as if they received the cash offer. The ownership percentage of the target firm shareholders in the new firm can be expressed as:

$$\text{Ownership} = \text{New shares issued} / (\text{New shares issued} + \text{Current shares of acquiring firm})$$

$$.28 = \text{New shares issued} / (\text{New shares issued} + 30,000,000)$$

$$\text{New shares issued} = 11,666,667$$

To find the exchange ratio, we divide the new shares issued to the shareholders of the target firm by the existing number of shares in the target firm, so:

$$\text{Exchange ratio} = \text{New shares} / \text{Existing shares in target firm}$$

$$\text{Exchange ratio} = 11,666,667 / 20,000,000$$

$$\text{Exchange ratio} = .5833$$

An exchange ratio of .5833 shares of the merged company for each share of the target company owned would make the value of the stock offer equivalent to the value of the cash offer.

16. a. The value of each company is the sum of the probability of each state of the economy times the value of the company in that state of the economy, so:

$$\text{Value}_{\text{Bentley}} = .70(\$300,000) + .30(\$110,000)$$

$$\text{Value}_{\text{Bentley}} = \$243,000$$

$$\text{Value}_{\text{Rolls}} = .70(\$260,000) + .30(\$80,000)$$

$$\text{Value}_{\text{Rolls}} = \$206,000$$

- b. The value of each company's equity is sum of the probability of each state of the economy times the value of the equity in that state of the economy. The value of equity in each state of the economy is the maximum of total company value minus the value of debt, or zero. Since Rolls is an all equity company, the value of its equity is simply the total value of the firm, or \$206,000. The value of Bentley's equity in a boom is \$160,000 (\$300,000 company value minus \$140,000 debt value), and the value of Bentley's equity in a recession is zero since the value of its debt is greater than the value of the company in that state of the economy. So, the value of Bentley's equity is:

$$\begin{aligned} \text{Equity}_{\text{Bentley}} &= .70(\$160,000) + .30(\$0) \\ \text{Equity}_{\text{Bentley}} &= \$112,000 \end{aligned}$$

The value of Bentley's debt in a boom is the full face value of \$140,000. In a recession, the value of the company's debt is \$110,000 since the value of the debt cannot exceed the value of the company. So, the value of Bentley's debt today is:

$$\begin{aligned} \text{Debt}_{\text{Bentley}} &= .70(\$140,000) + .30(\$110,000) \\ \text{Debt}_{\text{Bentley}} &= \$131,000 \end{aligned}$$

Note, this is also the value of the company minus the value of the equity, or:

$$\begin{aligned} \text{Debt}_{\text{Bentley}} &= \$243,000 - 112,000 \\ \text{Debt}_{\text{Bentley}} &= \$131,000 \end{aligned}$$

- c. The combined value of the companies, the combined equity value, and combined debt value is:

$$\begin{aligned} \text{Combined value} &= \$243,000 + 206,000 \\ \text{Combined value} &= \$449,000 \end{aligned}$$

$$\begin{aligned} \text{Combined equity value} &= \$112,000 + 206,000 \\ \text{Combined equity value} &= \$318,000 \end{aligned}$$

$$\text{Combined debt value} = \$131,000$$

- d. To find the value of the merged company, we need to find the value of the merged company in each state of the economy, which is:

$$\begin{aligned} \text{Boom merged value} &= \$300,000 + 260,000 \\ \text{Boom merged value} &= \$560,000 \end{aligned}$$

$$\begin{aligned} \text{Recession merged value} &= \$110,000 + 80,000 \\ \text{Recession merged value} &= \$190,000 \end{aligned}$$

So, the value of the merged company today is:

$$\begin{aligned} \text{Merged company value} &= .70(\$560,000) + .30(\$190,000) \\ \text{Merged company value} &= \$449,000 \end{aligned}$$

Since the merged company will still have \$140,000 in debt, the value of the equity in a boom is \$420,000, and the value of equity in a recession is \$50,000. So, the value of the merged company's equity is:

$$\begin{aligned}\text{Merged equity value} &= .70(\$420,000) + .30(\$50,000) \\ \text{Merged equity value} &= \$309,000\end{aligned}$$

The merged company will have a value greater than the face value of debt in both states of the economy, so the value of the company's debt is \$140,000.

- e. There is a wealth transfer in this case. The combined equity value before the merger was \$318,000, but the value of the equity in the merged company is only \$309,000, a loss of \$9,000 for stockholders. The value of the debt in the combined companies was only \$131,000, but the value of debt in the merged company is \$140,000 since there is no chance of default. The bondholders gained \$9,000, exactly the amount the stockholders lost.
- f. If the value of Bentley's debt before the merger is less than the lowest firm value, there is no coinsurance effect. Since there is no possibility of default before the merger, bondholders do not gain after the merger.

Challenge

17. a. To find the value of the target to the acquirer, we need to find the share price with the new growth rate. We begin by finding the required return for shareholders of the target firm. The earnings per share of the target are:

$$\text{EPS}_p = \$580,000/550,000 = \$1.05 \text{ per share}$$

The price per share is:

$$P_p = 9(\$1.05) = \$9.49$$

And the dividends per share are:

$$\text{DPS}_p = \$290\text{K}/550\text{K} = \$0.527$$

The current required return for Palmer shareholders, which incorporates the risk of the company is:

$$R_E = [\$0.527(1.05)/\$9.49] + .05 = .1083$$

The price per share of Palmer with the new growth rate is:

$$P_p = \$0.527(1.07)/(.1083 - .07) = \$14.72$$

The value of the target firm to the acquiring firm is the number of shares outstanding times the price per share under the new growth rate assumptions, so:

$$V_T^* = 550,000(\$14.72) = \$8,094,782.61$$

- b. The gain to the acquiring firm will be the value of the target firm to the acquiring firm minus the market value of the target, so:

$$\text{Gain} = \$8,094,782.61 - 550,000(\$9.49) = \$2,874,782.61$$

- c. The NPV of the acquisition is the value of the target firm to the acquiring firm minus the cost of the acquisition, so:

$$\text{NPV} = \$8,094,782.61 - 550,000(\$18) = -\$1,805,217.39$$

- d. The most the acquiring firm should be willing to pay per share is the offer price per share plus the NPV per share, so:

$$\text{Maximum bid price} = \$18 + (-\$1,805,217.39/550,000) = \$14.72$$

Notice that this is the same value we calculated earlier in part *a* as the value of the target to the acquirer.

- e. The price of the stock in the merged firm would be the market value of the acquiring firm plus the value of the target to the acquirer, divided by the number of shares in the merged firm, so:

$$P_{FP} = (\$25,000,000 + 8,094,782.61)/(1,000,000 + 110,000) = \$29.82$$

The NPV of the stock offer is the value of the target to the acquirer minus the value offered to the target shareholders. The value offered to the target shareholders is the stock price of the merged firm times the number of shares offered, so:

$$\text{NPV} = \$8,094,782.61 - 110,000(\$29.82) = \$4,815,119.47$$

- f. Yes, the acquisition should go forward, and Plant should offer the 110,000 shares since the NPV is higher.

- g. Using the new growth rate in the dividend growth model, along with the dividend and required return we calculated earlier, the price of the target under these assumptions is:

$$P_p = \$0.527(1.06)/(.1083 - .06) = \$11.56$$

And the value of the target firm to the acquiring firm is:

$$V_p^* = 550,000(\$11.56) = \$6,360,000.00$$

The gain to the acquiring firm will be:

$$\text{Gain} = \$6,360,000 - 550,000(\$9.49) = \$1,140,000.00$$

The NPV of the cash offer is now:

$$\text{NPV cash} = \$6,360,000 - 550,000(\$18) = -\$3,540,000$$

And the new price per share of the merged firm will be:

$$P_{FP} = [\$25M + 6,360,000]/(1,000,000 + 110,000) = \$28.25$$

And the NPV of the stock offer under the new assumption will be:

$$\text{NPV stock} = \$6,360,000 - 110,000(\$28.25) = \$3,252,252.25$$

Even with the lower projected growth rate, the stock offer still has a positive NPV. Plant should purchase Palmer with a stock offer of 110,000 shares.

18. a. To find the distribution of joint values, we first must find the joint probabilities. To do this, we need to find the joint probabilities for each possible combination of weather in the two towns. The weather conditions are independent; therefore, the joint probabilities are the products of the individual probabilities.

<u>Possible states</u>	<u>Joint probability</u>
Rain-Rain	.1(.1) = .01
Rain-Warm	.1(.4) = .04
Rain-Hot	.1(.5) = .05
Warm-Rain	.4(.1) = .04
Warm-Warm	.4(.4) = .16
Warm-Hot	.4(.5) = .20
Hot-Rain	.5(.1) = .05
Hot-Warm	.5(.4) = .20
Hot-Hot	.5(.5) = .25

Next, note that the revenue when rainy is the same regardless of which town. So, since the state "Rain-Warm" has the same outcome (revenue) as "Warm-Rain", their probabilities can be added. The same is true of "Rain-Hot" / "Hot-Rain" and "Warm-Hot" / "Hot-Warm". Thus the joint probabilities are:

<u>Possible states</u>	<u>Joint probability</u>
Rain-Rain	.01
Rain-Warm	.08
Rain-Hot	.10
Warm-Warm	.16
Warm-Hot	.40
Hot-Hot	.25

Finally, the joint values are the sums of the values of the two companies for the particular state.

<u>Possible states</u>		<u>Joint value</u>
Rain-Rain	€100,000 + 100,000 =	€200,000
Rain-Warm	€100,000 + 200,000 =	300,000
Rain-Hot	€100,000 + 400,000 =	500,000
Warm-Warm	€200,000 + 200,000 =	400,000
Warm-Hot	€200,000 + 400,000 =	600,000
Hot-Hot	€400,000 + 400,000 =	800,000

- b. Recall that if a firm cannot service its debt, the bondholders receive the value of the assets. Thus, the value of the debt is the value of the company if the face value of the debt is greater than the value of the company. If the value of the company is greater than the value of the debt, the value of the debt is its face value. Here, the value of the common stock is always the residual value of the firm over the value of the debt. So, the value of the debt and the value of the stock in each state is:

<u>Possible states</u>	<u>Joint Prob.</u>	<u>Joint Value</u>	<u>Debt Value</u>	<u>Stock Value</u>
Rain-Rain	.01	€200,000	€200,000	€0
Rain-Warm	.08	300,000	300,000	0
Rain-Hot	.10	500,000	400,000	100,000
Warm-Warm	.16	400,000	400,000	0
Warm-Hot	.40	600,000	400,000	200,000
Hot-Hot	.25	800,000	400,000	400,000

- c. The bondholders are better off if the value of the debt after the merger is greater than the value of the debt before the merger. The value of the debt is the smaller of the debt value or the company value. So, the value of the debt of each individual company before the merger in each state is:

<u>Possible states</u>	<u>Probability</u>	<u>Debt Value</u>
Rain	.10	€100,000
Warm	.40	200,000
Hot	.50	200,000

$$\text{Individual debt value} = .1(\text{€}100,000) + .4(\text{€}200,000) + .5(\text{€}200,000)$$

$$\text{Individual debt value} = \text{€}190,000$$

This means the total value of the debt for both companies pre-merger must be:

$$\text{Total debt value pre-merger} = 2(\text{€}190,000)$$

$$\text{Total debt value pre-merger} = \text{€}380,000$$

To get the expected debt value, post-merger, we can use the joint probabilities for each possible state and the debt values corresponding to each state we found in part c. Using this information to find the value of the debt in the post-merger firm, we get:

$$\begin{aligned} \text{Total debt value post-merger} &= .01(\text{€}200,000) + .08(\text{€}300,000) + .10(\text{€}400,000) \\ &\quad + .16(\text{€}400,000) + .40(\text{€}400,000) + .25(\text{€}400,000) \end{aligned}$$

$$\text{Total debt value post-merger} = \text{€}390,000$$

The bondholders are better off by €10,000. Since we have already shown that the total value of the combined company is the same as the sum of the value of the individual companies, the implication is that the stockholders are worse off by €10,000.

