

## SOLUTIONS TO PRACTICE PROBLEMS FOR M&A

You will want to use these to help complete the practical application due in Week 6 of Module 6

For the sake of these examples, assume A acquires B, whether through merger or consolidation, acquisition of stock or acquisition of assets

That means: A is the buyer (acquirer, bidder, etc.) and B is the target

Notations

V<sub>a</sub> Market value of A before the acquisition

V<sub>b</sub> Market value of B as a stand-alone firm

V<sub>ab</sub> Value of the merged firm

If the merger makes economic sense, then we know that V<sub>ab</sub> must be at least the sum of the market values of the two firms as separate entities.

That means, V<sub>ab</sub> >= V<sub>a</sub> + V<sub>b</sub>

V<sub>ab</sub> - (V<sub>a</sub> + V<sub>b</sub>) is the incremental gain from the acquisition, or  $\Delta V$

if  $\Delta V$  is positive, then the synergy generates "synergy"

Alternatively, the offer price - V<sub>b</sub> is the minimum synergy gained in the merger.

V<sub>b\*</sub> is the value of B to A, which is V<sub>b</sub> +  $\Delta V$

V<sub>b\*</sub> is the value of B as a stand-alone plus the added value gained when the firm is a part of firm A (the added "synergy" value)

NPV = V<sub>b\*</sub> - cost      NPV of a deal must be be >= 0 for it to be acceptable, the NPV is the value of the target to the acquirer less the cost of acquisition, whether the cost is in cash or stock in the combined firm.

- V<sub>b\*</sub>
- 1 Better Builders has 1500 shares outstanding at a market price of \$34.55 per share. Arbitrary Construction has 5,000 shares outstanding at a market price of \$36.75 per share. Neither firm has any debt. Arbitrary Construction is acquiring Better Builders. The incremental value of the acquisition is \$2300. What is the value of Better Builders to Arbitrary Construction?

$$\begin{aligned} \text{V}_b &= \text{market value of target} & \$51,825 & 1500 \# \text{ shares outstanding} * \text{price per share of } \$34.55 \\ \text{V}_b^* &= \text{market value} + \text{incremental} & \$54,125 \end{aligned}$$

- minimum  
synergy
- 2 Hossain, Inc. has offered \$187 million cash for all of the common stock of Tower Corp.. Based on recent market information Tower Corp. is worth \$182.5 million as an independent operation. If the merger makes economic sense for Hossain, Inc. what is the minimum estimated value of the synergistic benefits from the merger?

Minimum synergy must be the difference between the offer price and the market value of the target as an independent operation

$$\begin{aligned} \text{offer price} & & \$187.00 \text{ million} \\ \text{market value of the target} & & \$182.50 \text{ million} \\ \text{offer price} - \text{market value} = & & \$4.50 \text{ million} \end{aligned}$$

- V<sub>b</sub> and  $\Delta V$
- 3 Firms A and B are competitors with very similar assets and business risks. Both are all-equity firms with aftertax cash flows of \$10 per year forever, and both have an overall cost of capital of 10%. Firm A is thinking of buying Firm B. The aftertax cash flow from the merged firm would be \$21 per year. Does the merger generate synergy? What is V<sub>b\*</sub>, what is  $\Delta V$ ?

If each firm has aftertax cash flows of \$10 per year, then the \$21 combined represents an incremental \$1 per year (forever) for the acquirer. Go back to Module 2 when we valued perpetual cash flows.

The value of the combined firm is then the combined annual cash flows divided by the discount rate of 10%. (go back to valuing a perpetuity in Module 2 if necessary)

$$\$21/0.10 = \$210$$

First question, yes to the synergy

Synergy is the additional value related to the firm being combined. This might be phrased as "incremental"

Firm A alone is worth  $\$10/0.10 = V_a = \$100$   
 Firm B alone is worth  $\$10/0.10 = V_b = \$100$   
 $V_a + V_b = \$200$   
 $\Delta V = V_{ab} - V_a - V_b = \$10$   
 $V_{ab}^* = V_b + \Delta V = \$100 + \$10 = \$110$

value", it could be a cost reduction, it could be a change in revenues, change in operating profit or EBIT, change in depreciation, tax changes, changes in capital requirements, it could be a sales percentage increase, plus anything else that increases the value of the acquirer above the price paid.

- Vab 4 Alpha Co. is considering buying Bravo, Inc. Alpha has 1mm shares outstanding at a current market price of \$4.50 per share and Bravo has 500,000 shares outstanding at a market price of \$2.25 per share. Alpha is a paper distribution company and Bravo is a paper manufacturer. If the firms combine, Alpha expects an annual cost reduction of \$5,000. Alpha has an overall cost of capital of 8%. What is the synergy value of this proposed acquisition? What is the expected value of the combined firm (before accounting for the purchase price)?

cost of capital for each firm:

annual cost reduction

$$V_a = 1\text{mm shares} * \$4.50/\text{sh}$$

$$V_b = 500,000 \text{ sh} * \$2.25/\text{sh}$$

$$\Delta V = PV \text{ of annual savings} =$$

$$5,000/0.08$$

8.0% This is the "interest rate" or "discount rate" we use to determine the PV of the cash flows

\$5,000 Annual savings is as good as increased revenue, the effect is an increase in annual cash flows.

$$\$4,500,000 \text{ Pre-merger value of acquirer (bidder)}$$

$$\$1,125,000 \text{ Pre-merger value of target}$$

\$62,500 PV calculated as PV of the annual savings/cost of capital. This is an annuity, so we value it as an annuity.

Synergy value =  $\Delta V$

$$V_{ab} = V_a + V_b + \Delta V$$

\$5,687,500 Value of combined firm (before the acquisition is paid for)

Note that we have now valued firms in 2 different ways, the PV of future cash flows discounted at the appropriate cost of capital and also as the total market value of # shares \* current market price.

- max cash offer price 5 Abercrombie, Inc. is looking at acquiring Butterworth Co. in an all cash deal. Abercrombie has 2mm shares outstanding at \$23 per share and Butterworth, a private company, has expected annual cash flows of \$2.2 million per year (forever). Both firms have a 10% cost of capital. Abercrombie anticipates that with their crack marketing team, they would be able to increase Butterworth's annual cash flows by 5% annually if the firms combine. What is the synergy value of this merger? What is the maximum cash price Abercrombie should offer?

$$V_a, \text{ pre-merger value of acquirer} = 2,000,000 \text{ shares} * \$23 \text{ per share}$$

\$46,000,000 not necessary for final answer

$$V_b, \text{ pre-merger value of target} = 2.2\text{mm per year}/0.10$$

\$22,000,000 annual cash flows of target discounted as an annuity at the

$$\Delta V = PV \text{ of annual revenue increase} = (.05 * 2,200,000)/0.10$$

\$1,100,000 <-- this is the synergy value

Max cash price that should be offered =  $V_b + \text{increase in value due to the merger of the firms (the synergy)}$

$$\text{Max cash price (total)} = V_b + \Delta V$$

\$23,100,000

What if the target wasn't private, but had 500,000 outstanding shares? What would be the max price per share that Abercrombie should pay for Butter worth?

$$\text{Max price per share} = \$23,100,000/500,000$$

\$46.20

If Abercrombie offers more than the market value of Butterworth, plus the PV of the increased revenues, this would be a negative NPV transaction.

- 6 Apricot Technologies has offered to acquire Benson Co. for 15% of the merged firm to Benson shareholders. The market value of Apricot is \$20mm and Benson has a market value of \$3 million. It is anticipated that with the acquisition, the combined annual after-tax cash flows would increase by \$50,000.

- Vb\* 6a What is the total value of Benson to Apricot? (Vb\*) Assume a 8% discount rate is appropriate.

$$\Delta V = PV \text{ of annual revenue increase} = (50,000/0.08)$$

$$V_{ab}^* = V_b + \Delta V = \$3,000,000 + \$625,000$$

\$625,000

\$3,625,000

- cost of stk 6b What is the cost of the stock offer?

We first need the total value of the combined firm,  $V_{ab} = V_a + V_b + \Delta V$

\$23,625,000

The cost is 15% of the combined firm

\$3,543,750

NPV	6c	What is the NPV of this deal as structured? $NPV = Vb^* - \text{cost}$ $= 3,625,000 - 3,543,750$	\$81,250												
eps merged firm	7	Prior to a potential merger Alpha Corp. has \$1250 in total earnings with 750 shares outstanding at a market price per share of \$42. Beta Inc. has \$740 in total earnings with 220 shares outstanding at \$18 per share. Assume Alpha Corp. acquires Beta Inc. via an exchange of stock at a price of \$20 for each share of Beta Inc. stock. Both Alpha Corp. and Beta Inc. have no debt outstanding. What will Alpha Corp. earnings per share be after the merger?													
		Cost of acquisition = # target shares * offer price per share	\$ 4,400 Beta has 220 shares which are purchased for \$20												
		shares offered = value of shares offered/acquirer's share price	104.76 \$4400 value of shares/\$42 Alpha Corp share price = 104.76 shares												
		EPS = combined earnings/total number of shares in the combined firm First, combined earnings = 1250 + 740 total shares = acquirer's shares + offered shares = 750 + 104.76 EPS = 1990/854.76	\$ 1,990.00 854.76 2.33												
		If you round the # shares offered to 105, the answer doesn't change in this case --> minor changes, such as 1-2 cents aren't a problem	2.33												
NPV of merger	8	Consider the following premerger information about a acquiring (bidding) firm (Firm A) and a target firm (Firm B). Assume that both firms have no debt outstanding.  Firm A has estimated that the value of the synergistic benefits from acquiring Firm B is \$3100													
		<table border="1"> <thead> <tr> <th></th> <th>Firm A</th> <th>Firm B</th> </tr> </thead> <tbody> <tr> <td>Shares outstanding</td> <td>1,700</td> <td>1,000</td> </tr> <tr> <td>Price per share</td> <td>\$32</td> <td>\$26</td> </tr> <tr> <td>Market value (shares * price/sh), Va and Vb</td> <td>\$54,400</td> <td>\$26,000</td> </tr> </tbody> </table>		Firm A	Firm B	Shares outstanding	1,700	1,000	Price per share	\$32	\$26	Market value (shares * price/sh), Va and Vb	\$54,400	\$26,000	<- interim calculations
	Firm A	Firm B													
Shares outstanding	1,700	1,000													
Price per share	\$32	\$26													
Market value (shares * price/sh), Va and Vb	\$54,400	\$26,000													
		<p>synergy  value of target to acquirer      <math>Vb^*</math>  cost of offer (B shares * offer price) (\$29*1000)</p>	3100 \$29,100 = $Vb + \text{synergy}$ \$29,000 = shares in target * offer price per share												
	8a	If Firm B is willing to be acquired for \$29 per share in cash what is the NPV of the merger? Cost of the merger in cash = shares in target (B) * offer price													
		NPV = $Vb$ , the target's mkt value + synergy - cost	\$100 = 26,000 + 3,100 - 29,000												
Share price post merger	8b	For the above acquisition, assuming Firm B accepts the \$29 per share bid, what will be the price per share of the merged firm? (ignore any acquisitions costs at this point)  This is a positive NPV acquisition and those benefits go to the shareholders. The share price of the acquirer will be its pre-merger market value plus the NPV of the merger, all divided by the number of outstanding shares in A. We are not including the acquisition costs yet in this problem.													
		Market value of merged firm (Va + NPV)	\$54,500 ((1700 shares * 32/share) + 100)												
		Share price of merged firm:	\$32.06 ((1700 shares * 32/share) + 100)/1700 shares												
Merger premium	8c	For the above acquisition, assuming Firm B accepts the \$29 per share bid, what will be the merger premium? Merger premium is the total amount above the market value of the target.													

Merger premium = (offer price per share - market price per share) \* # shares

(29-26)\*1000 shares \$3,000

Note that we do not include the synergy here, simply the (difference between offer price and market price)\*#

value of  
acquirer  
after  
acquisition

- 9a RotoTiller Co. is acquiring Big Box Rentals for \$27400 in cash. RotoTiller Co. has 1500 shares outstanding at a market price per share of \$44. Big Box Rentals has 2100 shares outstanding at \$12 per share. Neither firm has outstanding debt. The incremental value (synergy) of the acquisition is \$1700. What is the value of RotoTiller Co. after the acquisition?

This is the value of the combined firm less the cost of acquisition. If the post-acquisition cost of the acquirer is less than its pre-acquisition value, the acquisition destroyed value for the shareholders. That also means that the NPV is negative and the deal should have been rejected.

Pre-merger market value of acquire \$66,000 = # shares \* market price

Pre-merger market value of target \$25,200 = # shares \* market price

Synergy \$1,700 given in setup

Combined value = mkt value of acquirer + mkt value of target + incremental value (synergy) - cost of acquisition

The cost of the acquisition (cash  
price paid) \$27,400 given in setup

$$\text{final equation: } \$65,500 = \$66,000 + \$25,200 + \$1,700 - \$27,400$$

- 9b Now, what would the share price be for the newly merged firm?

We have the combined value of the firm, of \$65,500 and the acquirer has 1500 shares outstanding (no change from pre-merger shares)

Share price for merged firm = \\$ 43.67 = (\\$65,500 / 1500 shares)

final equation: (mkt value Acq + mkt value target + synergy - price paid)shares of acquirer

In some problems, you won't be given the acquisition price, but a price per share for the target. The price for the acquisition is the # shares of the target \* offer price

sh issued  
and total sh  
after acq

- 10 Radio Supply is being acquired by Northwest Supply Co. for \$127,500 worth of Northwest Supply Co. stock. Radio Supply has 3,450 shares outstanding at a price of \$37 per share. Northwest Supply Co. has 9,500 shares outstanding at market price of \$53 a share. The incremental value of the acquisition is \$1,350. How many shares will the acquirer have outstanding after the new shares are issued to Radio Supply shareholders?

Radio Supply is the target and they are being paid with Northwest Supply stock worth \$127,500. That means the acquirer (Northwest) needs to issue new shares. The price per share will be their current price of \$53 per share.

Info used for the calculations: Pull the info from the problem setup.

# shares	\$/sh	
9,500	\$53.00 acquirer, NW Supply	always be clear on who is buyer and who is seller
3,450	\$37.00 target, Radio Supply	
Value of offer	\$127,500	This is to be paid using newly issued acquirer stock
Synergy (incremental value)		\$1,350

# new shares issued = 127,500/53

2,405.66 = value of offer (that is the \$127,500 divided by the current acquirer's stock price (\$53/share))

pre-acq sh of bidder

9500 original # shares outstanding for the acquirer

total outstanding shares

11,905.66 simply the sum of the new shares and the original acquirer shares