

HOMWORK ASSIGNMENT 1 SOLUTION

CHAPTER 27

- 27.4 a.** Increase; Increase. If the terms of the cash discount are made less favorable to customers, the accounts receivable period will lengthen. This will increase both the cash cycle and the operating cycle.
- b.* Increase; No change. This will shorten the accounts payable period, which will increase the cash cycle. It will have no effect on the operating cycle since the accounts payable period is not part of the operating cycle.
- c.* Decrease; Decrease. If more customers pay in cash, the accounts receivable period will decrease. This will decrease both the cash cycle and the operating cycle.
- d.* Decrease; Decrease. Assume the accounts payable period and inventory period do not change. Fewer raw materials purchased will reduce the inventory period, which will decrease both the cash cycle and the operating cycle.
- e.* Decrease; No change. If more raw materials are purchased on credit, the accounts payable period will tend to increase, which would decrease the cash cycle. We should say that this may not be the case. The accounts payable period is a decision made by the company's management. The company could increase the accounts payable account and still make the payments in the same number of days. This would leave the accounts payable period unchanged, which would leave the cash cycle unchanged. The change in credit purchases made on credit will affect neither the inventory period nor the accounts receivable period, so the operating cycle will not change.
- f.* Increase; Increase. If more goods are produced for inventory, the inventory period will increase. This will increase both the cash cycle and operating cycle.

27.6 The operating cycle is the inventory period plus the receivables period. The inventory turnover and inventory period are:

$$\begin{aligned}\text{Inventory turnover} &= \text{COGS}/\text{Average inventory} \\ \text{Inventory turnover} &= \$105,817/\{[\$15,382 + 16,147]/2\} \\ \text{Inventory turnover} &= 6.7124 \text{ times}\end{aligned}$$

$$\begin{aligned}\text{Inventory period} &= 365 \text{ days}/\text{Inventory turnover} \\ \text{Inventory period} &= 365 \text{ days}/6.7124 \\ \text{Inventory period} &= 54.38 \text{ days}\end{aligned}$$

And the receivables turnover and receivables period are:

$$\begin{aligned}\text{Receivables turnover} &= \text{Credit sales}/\text{Average receivables} \\ \text{Receivables turnover} &= \$143,625/\{[\$12,169 + 12,682]/2\} \\ \text{Receivables turnover} &= 11.56 \text{ times}\end{aligned}$$

Receivables period = 365 days/Receivables turnover
 Receivables period = 365 days/11.5589
 Receivables period = 31.5774 days

So, the operating cycle is:

Operating cycle = 54.38 days + 31.58 days
 Operating cycle = 85.95 days

The cash cycle is the operating cycle minus the payables period. The payables turnover and payables period are:

Payables turnover = COGS/Average payables
 Payables turnover = $\$105,817 / \{[\$13,408 + 14,108] / 2\}$
 Payables turnover = 7.6913 times

Payables period = 365 days/Payables turnover
 Payables period = 365 days/7.6913
 Payables period = 47.46 days

So, the cash cycle is:

Cash cycle = 85.95 days – 47.46 days
 Cash cycle = 38.50 days

The firm is receiving cash on average 38.50 days after it pays its bills.

- 27.7 a.** The payables period is zero since the company pays immediately. Sales in the year following this one are projected to be 15% greater in each quarter. Therefore, Q1 sales for the next year will be $\$830 (1.15) = \954.50 . The payment in each period is 30 percent of next period's sales, so:

	<u>Q1</u>	<u>Q2</u>	Q3	Q4
Payment of accounts	\$223.50	\$271.50	\$294.00	\$286.35

- b.** Since the payables period is 90 days, the payment in each period is 30 percent of the current period sales, so:

	<u>Q1</u>	<u>Q2</u>	Q3	Q4
Payment of accounts	\$249.00	\$223.50	\$271.50	\$294.00

- c.** Since the payables period is 60 days, the payment in each period is 2/3 of last quarter's orders, plus 1/3 of this quarter's orders, or:

Quarterly payments = $2/3(.30)$ times current sales + $1/3(.30)$ next period sales.

	<u>Q1</u>	<u>Q2</u>	Q3	Q4
Payment of accounts	\$240.50	\$239.50	\$279.00	\$291.45

- 27.9 a.** The November sales must have been the total uncollected sales minus the uncollected sales from December, divided by the collection rate two months after the sale, so:

$$\text{November sales} = (\$79,800 - 57,200)/0.15$$

$$\text{November sales} = \$150,666.67$$

- b.** The December sales are the uncollected sales from December divided by the collection rate of the previous months' sales, so:

$$\text{December sales} = \$57,200/0.35$$

$$\text{December sales} = \$163,428.57$$

- c.** The collections each month for this company are:

$$\text{Collections} = 0.15(\text{Sales from 2 months ago}) + 0.20(\text{Last months sales}) + 0.65 (\text{Current sales})$$

$$\text{January collections} = 0.15(\$150,666.67) + 0.20(\$163,428.57) + 0.65(\$173,000)$$

$$\text{January collections} = \$167,735.71$$

$$\text{February collections} = 0.15(\$163,428.57) + 0.20(\$173,000) + 0.65(\$184,000)$$

$$\text{February collections} = \$178,714.29$$

$$\text{March collections} = 0.15(\$173,000) + 0.20(\$184,000) + 0.65(\$205,000)$$

$$\text{March collections} = \$196,000.00$$

- 27.10**The sales collections each month will be:

$$\text{Sales collections} = 0.35(\text{current month sales}) + 0.60(\text{previous month sales})$$

Given this collection, the cash budget will be:

	<u>April</u>	<u>May</u>	<u>June</u>
Beginning cash balance	\$448,000	\$398,160	\$508,544
Cash receipts			
Cash collections from credit sales	414,400	586,560	625,440
Total cash available	862,400	984,720	1,133,984
Cash disbursements			
Purchases	249,600	235,200	280,800
Wages, taxes, and expenses	63,600	77,136	80,480
Interest	18,240	18,240	18,240
Equipment purchases	132,800	145,600	0
Total cash disbursements	464,240	476,176	379,520
Ending cash balance	<u>\$398,160</u>	<u>\$508,544</u>	<u>\$754,464</u>

CHAPTER 29

29.7 The total sales of the firm are equal to the total credit sales since all sales are on credit, so:

$$\begin{aligned}\text{Total credit sales} &= 5,600(\$425) \\ \text{Total credit sales} &= \$2,380,000\end{aligned}$$

The average collection period is the percentage of accounts taking the discount times the discount period, plus the percentage of accounts not taking the discount times the days' until full payment is required, so:

$$\begin{aligned}\text{Average collection period} &= 0.60(10) + 0.40(40) \\ \text{Average collection period} &= 22 \text{ days}\end{aligned}$$

The receivables turnover is 365 divided by the average collection period, so:

$$\begin{aligned}\text{Receivables turnover} &= 365/22 \\ \text{Receivables turnover} &= 16.591 \text{ times}\end{aligned}$$

And the average receivables are the credit sales divided by the receivables turnover so:

$$\begin{aligned}\text{Average receivables} &= \$2,380,000/16.591 \\ \text{Average receivables} &= \$143,452.05\end{aligned}$$

If the firm increases the cash discount, more people will pay sooner, thus lowering the average collection period. If the ACP declines, the receivables turnover increases, which will lead to a decrease in the average receivables.

29.9a. The cash outlay for the credit decision is the variable cost of the engine. If this is a one-time order, the cash inflow is the present value of the sales price of the engine times one minus the default probability. So, the NPV per unit is:

$$\begin{aligned}\text{NPV} &= -\$1,600,000 + (1 - 0.005)(\$1,870,000)/1.029 \\ \text{NPV} &= \$208,211.86 \text{ per unit}\end{aligned}$$

The company should fill the order.

b. To find the breakeven probability of default, π , we simply use the NPV equation from part *a*, set it equal to zero, and solve for π . Doing so, we get:

$$\begin{aligned}\text{NPV} = 0 &= -\$1,600,000 + (1 - \pi)(\$1,870,000)/1.029 \\ \pi &= 0.1196 \text{ or } 11.96\%\end{aligned}$$

We would not accept the order if the default probability was higher than 11.96 percent.

c. If the customer will become a repeat customer, the cash inflow changes. The cash inflow is

now one minus the default probability, times the sales price minus the variable cost. We need to use the sales price minus the variable cost since we will have to build another engine for the customer in one period. Additionally, this cash inflow is now a perpetuity, so the NPV under these assumptions is:

$$\begin{aligned} \text{NPV} &= -\$1,600,000 + (1 - 0.005)(\$1,870,000 - 1,600,000)/0.029 \\ \text{NPV} &= \$7,663,793.10 \text{ per unit} \end{aligned}$$

The company should fill the order. The breakeven default probability under these assumptions is:

$$\begin{aligned} \text{NPV} = 0 &= -\$1,600,000 + (1 - \pi)(\$1,870,000 - 1,600,000)/0.029 \\ \pi &= 0.8281 \text{ or } 82.81\% \end{aligned}$$

We would not accept the order if the default probability was higher than 82.81 percent. This default probability is much higher than in part *b* because the customer may become a repeat customer.

d. It is assumed that if a person has paid his or her bills in the past, they will pay their bills in the future. This implies that if someone doesn't default when credit is first granted, then they will be a good customer far into the future, and the possible gains from the future business outweigh the possible losses from granting credit the first time.

29.10 The cost of switching is any lost sales from the existing policy plus the incremental variable costs under the new policy, so:

$$\begin{aligned} \text{Cost of switching} &= \$720(1,305) + \$495(1,380 - 1,305) \\ \text{Cost of switching} &= \$976,725 \end{aligned}$$

The benefit of switching is any increase in the sales price minus the variable costs per unit, times the incremental units sold, so:

$$\begin{aligned} \text{Benefit of switching} &= (\$720 - 495)(1,380 - 1,305) \\ \text{Benefit of switching} &= \$16,875 \end{aligned}$$

The benefit of switching is a perpetuity, so the NPV of the decision to switch is:

$$\begin{aligned} \text{NPV} &= -\$976,275 + \$16,875/0.015 \\ \text{NPV} &= \$148,275.00 \end{aligned}$$

The firm will have to bear the cost of sales for one month before they receive any revenue from credit sales, which is why the initial cost is for one month. Receivables will grow over the one month credit period and will then remain stable with payments and new sales offsetting one another.

29.14The cash flow from either policy is:

$$\text{Cash flow} = (P - v)Q$$

So, the cash flows from the old policy are:

$$\text{Cash flow from old policy} = (\$91 - 47)(3,850)$$

$$\text{Cash flow from old policy} = \$169,400$$

And the cash flow from the new policy would be:

$$\text{Cash flow from new policy} = (\$94 - 47)(3,940)$$

$$\text{Cash flow from new policy} = \$185,180$$

So, the incremental cash flow would be:

$$\text{Incremental cash flow} = \$185,180 - 169,400$$

$$\text{Incremental cash flow} = \$15,780$$

The incremental cash flow is a perpetuity. The cost of initiating the new policy is:

$$\text{Cost of new policy} = -[PQ + v(Q' - Q)]$$

So, the NPV of the decision to change credit policies is:

$$\text{NPV} = -[(\$91)(3,850) + (\$47)(3,940 - 3,850)] + \$15,780/0.025$$

$$\text{NPV} = \$276,620$$

29.17The cost of switching credit policies is:

$$\text{Cost of new policy} = -[PQ + Q(v' - v) + v'(Q' - Q)]$$

And the cash flow from switching, which is a perpetuity, is:

$$\text{Cash flow from new policy} = [Q'(P' - v) - Q(P - v)]$$

To find the breakeven quantity sold for switching credit policies, we set the NPV equal to zero and solve for Q' . Doing so, we find:

$$\text{NPV} = 0 = -[(\$91)(3,850) + (\$47)(Q' - 3,850)] + [(Q')(\$94 - 47) - (3,850)(\$91 - 47)]/0.025$$

$$0 = -\$350,350 - \$47Q' + \$180,950 + \$1,880Q' - \$6,776,000$$

$$\$1,833Q' = \$6,945,400$$

$$Q' = 3,789.09$$

CHAPTER 13

13.9 Here we have the WACC and need to find the debt-equity ratio of the company. Setting up the WACC equation, we find:

$$\text{WACC} = 0.0980 = 0.15(S/V) + 0.0750(B/V)(1 - 0.35)$$

Rearranging the equation, we find:
 $0.0980(V/S) = 0.15 + 0.0750(0.65)(B/S)$

Now we must realize that the V/S is just the equity multiplier, which is equal to:

$$V/S = 1 + B/S$$

$$.0980(B/S + 1) = .15 + .04875(B/S)$$

Now we can solve for B/S as:

$$.04925(B/S) = .052$$

$$B/S = 1.0558$$

13.12a. Using the equation to calculate WACC, we find:

$$\text{WACC} = 0.112 = (1/1.65)(0.15) + (0.65/1.65)(1 - 0.35) r_B$$

$$r_B = 0.0824 \text{ or } 8.24\%$$

b. Using the equation to calculate WACC, we find:

$$\text{WACC} = 0.112 = (1/1.65) r_S + (0.65/1.65)(0.064)$$

$$r_S = 0.1432 \text{ or } 14.32\%$$

13.14a. We will begin by finding the market value of each type of financing. We find:

$$MV_B = 200,000(\$1,000)(0.93) = \$186,000,000$$

$$MV_S = 8,500,000(\$34) = \$289,000,000$$

And the total market value of the firm is:

$$V = \$186,000,000 + 289,000,000 = \$475,000,000$$

So, the market value weights of the company's financing is:

$$B/V = \$186,000,000/\$475,000,000 = 0.3916$$

$$S/V = \$289,000,000/\$475,000,000 = 0.6084$$

b. For projects equally as risky as the firm itself, the WACC should be used as the discount rate.

First we can find the cost of equity using the CAPM. The cost of equity is:

$$r_S = 0.05 + 1.20(0.07) = 0.1340 \text{ or } 13.40\%$$

The cost of debt is the YTM of the bonds, so:

$$P_0 = \$930 = \$37.5 A_r^{30} + \$1,000/(1+r)^{30}$$

$$r = 4.163\%$$

$$\text{YTM} = 4.163\% \times 2 = 8.33\%$$

And the aftertax cost of debt is:

$$r_B = (1 - 0.35)(.0833) = 0.0541 \text{ or } 5.41\%$$

Now we can calculate the WACC as:

$$\text{WACC} = 0.1340(0.6084) + 0.0541(0.3916) = 0.1027 \text{ or } 10.27\%$$

13.15a. Projects Y and Z.

- b.* Using the CAPM to consider the projects, we need to calculate the expected return of each project given its level of risk. This expected return should then be compared to the expected return of the project. If the return calculated using the CAPM is lower than the project expected return, we should accept the project; if not, we reject the project. After considering risk via the CAPM:

$$E[W] = 0.05 + 0.75(0.11 - 0.05) = 0.0950 < 0.10, \text{ so accept W}$$

$$E[X] = 0.05 + 0.90(0.11 - 0.05) = 0.1040 > 0.102, \text{ so reject X}$$

$$E[Y] = 0.05 + 1.20(0.11 - 0.05) = 0.1220 > 0.12, \text{ so reject Y}$$

$$E[Z] = 0.05 + 1.50(0.11 - 0.05) = 0.1400 < .15, \text{ so accept Z}$$

- c.* Project W would be incorrectly rejected; Project Y would be incorrectly accepted.

13.18 Using the debt-equity ratio to calculate the WACC, we find:

$$\text{WACC} = (0.65/1.65)(0.055) + (1/1.65)(0.15) = 0.1126 \text{ or } 11.26\%$$

Since the project is riskier than the company, we need to adjust the project discount rate for the additional risk. Using the subjective risk factor given, we find:

$$\text{Project discount rate} = 11.26\% + 2.00\% = 13.26\%$$

CHAPTER 16

- 16.1 a. A table outlining the income statement for the three possible states of the economy is shown below. The EPS is the net income divided by the 5,000 shares outstanding. The last row shows the percentage change in EPS the company will experience in a recession or an expansion economy.

	<u>Recessi</u> <u>on</u>	<u>Norm</u> <u>al</u>	<u>Expansi</u> <u>on</u>
EBIT	\$7,600	\$19,000	\$24,700
Interest	<u>0</u>	<u>0</u>	<u>0</u>
NI	<u>\$7,600</u>	<u>\$19,000</u>	<u>\$24,700</u>
EPS	\$ 1.52	\$ 3.80	\$ 4.94
%ΔEPS	-60	—	+30

- b. If the company undergoes the proposed recapitalization, it will repurchase:

Share price = Equity / Shares outstanding

Share price = \$225,000/5,000

Share price = \$45

Shares repurchased = Debt issued / Share price

Shares repurchased = \$90,000/\$45

Shares repurchased = 2,000

The interest payment each year under all three scenarios will be:

Interest payment = \$90,000(0.08) = \$7,200

The last row shows the percentage change in EPS the company will experience in a recession or an expansion economy under the proposed recapitalization.

	<u>Recession</u>	<u>Normal</u>	<u>Expansion</u>
EBIT	\$7,600	\$19,000	\$24,700
Interest	<u>7,200</u>	<u>7,200</u>	<u>7,200</u>
NI	<u>\$ 400</u>	<u>\$11,800</u>	<u>\$17,500</u>
EPS	\$0.13	\$ 3.93	\$ 5.83
%ΔEPS	-96.61	—	+48.31

- 16.4 a.** Under Plan I, the unlevered company, net income is the same as EBIT with no corporate tax. The EPS under this capitalization will be:

$$\begin{aligned} \text{EPS} &= \$750,000/240,000 \text{ shares} \\ \text{EPS} &= \$3.13 \end{aligned}$$

Under Plan II, the levered company, EBIT will be reduced by the interest payment. The interest payment is the amount of debt times the interest rate, so:

$$\begin{aligned} \text{NI} &= \$750,000 - 0.10(\$3,100,000) \\ \text{NI} &= \$440,000 \end{aligned}$$

And the EPS will be:

$$\begin{aligned} \text{EPS} &= \$440,000/160,000 \text{ shares} \\ \text{EPS} &= \$2.75 \end{aligned}$$

Plan I has the higher EPS when EBIT is \$750,000.

- b.** Under Plan I, the net income is \$1,500,000 and the EPS is:

$$\begin{aligned} \text{EPS} &= \$1,500,000/240,000 \text{ shares} \\ \text{EPS} &= \$6.25 \end{aligned}$$

Under Plan II, the net income is:

$$\begin{aligned} \text{NI} &= \$1,500,000 - 0.10(\$3,100,000) \\ \text{NI} &= \$1,190,000 \end{aligned}$$

And the EPS is:

$$\begin{aligned} \text{EPS} &= \$1,190,000/160,000 \text{ shares} \\ \text{EPS} &= \$7.44 \end{aligned}$$

Plan II has the higher EPS when EBIT is \$1,500,000.

- c.** To find the breakeven EBIT for two different capital structures, we simply set the equations for EPS equal to each other and solve for EBIT. The breakeven EBIT is:

$$\begin{aligned} \text{EBIT}/240,000 &= [\text{EBIT} - 0.10(\$3,100,000)]/160,000 \\ \text{EBIT} &= \$930,000 \end{aligned}$$

- 16.6 a.** The income statement for each capitalization plan is:

	<u>I</u>	<u>II</u>	<u>All- equity</u>
EBIT	\$12,00	\$12,00	\$12,00
	0	0	0
Interes t	<u>2,000</u>	<u>3,000</u>	<u>0</u>

NI	<u>\$10,00</u>	<u>\$9,000</u>	<u>\$12,00</u>
	<u>0</u>		<u>0</u>
EPS	\$ 6.67	\$ 8.18	\$ 5.22

Plan II has the highest EPS; the all-equity plan has the lowest EPS.

- b. The breakeven level of EBIT occurs when the capitalization plans result in the same EPS. The EPS is calculated as:

$$\text{EPS} = (\text{EBIT} - r_B B) / \text{Shares outstanding}$$

This equation calculates the interest payment ($r_B B$) and subtracts it from the EBIT, which results in the net income. Dividing by the shares outstanding gives us the EPS. For the all-equity capital structure, the interest paid is zero. To find the breakeven EBIT for two different capital structures, we simply set the equations equal to each other and solve for EBIT. The breakeven EBIT between the all-equity capital structure and Plan I is:

$$\begin{aligned} \text{EBIT}/2,300 &= [\text{EBIT} - 0.10(\$20,000)]/1,500 \\ \text{EBIT} &= \$5,750 \end{aligned}$$

And the breakeven EBIT between the all-equity capital structure and Plan II is:

$$\begin{aligned} \text{EBIT}/2,300 &= [\text{EBIT} - 0.10(\$30,000)]/1,100 \\ \text{EBIT} &= \$5,750 \end{aligned}$$

The break-even levels of EBIT are the same because of M&M Proposition I without taxes, as will be explained in 16.7. Essentially, this is because the different capital structures do not affect the price per share.

- c. Setting the equations for EPS from Plan I and Plan II equal to each other and solving for EBIT, we get:

$$\begin{aligned} [\text{EBIT} - 0.10(\$20,000)]/1,500 &= [\text{EBIT} - 0.10(\$30,000)]/1,100 \\ \text{EBIT} &= \$5,750 \end{aligned}$$

This break-even level of EBIT is the same as in part *b* again because of M&M Proposition I without taxes, as will be explained in 16.7. Essentially, this is because the different capital structures do not affect the price per share.

- d. The income statement for each capitalization plan with corporate income taxes is:

	<u>I</u>	<u>II</u>	<u>All-equity</u>
EBIT	\$12,00	\$12,00	\$12,00
	0	0	0
Interest	2,000	3,000	0
Taxes	<u>4,000</u>	<u>3,600</u>	<u>4,800</u>

NI	<u>\$6,000</u>	<u>\$5,400</u>	<u>\$7,200</u>
EPS	\$ 4.00	\$ 4.91	\$ 3.13

Plan II still has the highest EPS; the all-equity plan still has the lowest EPS.

We can calculate the EPS as:

$$\text{EPS} = [(\text{EBIT} - r_B B)(1 - t_C)] / \text{Shares outstanding}$$

This is similar to the equation we used before, except that now we need to account for taxes. Again, the interest expense term is zero in the all-equity capital structure. So, the breakeven EBIT between the all-equity plan and Plan I is:

$$\begin{aligned} \text{EBIT}(1 - 0.40)/2,300 &= [\text{EBIT} - 0.10(\$20,000)](1 - 0.40)/1,500 \\ \text{EBIT} &= \$5,750 \end{aligned}$$

The breakeven EBIT between the all-equity plan and Plan II is:

$$\begin{aligned} \text{EBIT}(1 - 0.40)/2,300 &= [\text{EBIT} - 0.10(\$30,000)](1 - 0.40)/1,100 \\ \text{EBIT} &= \$5,750 \end{aligned}$$

And the breakeven between Plan I and Plan II is:

$$\begin{aligned} [\text{EBIT} - 0.10(\$20,000)](1 - 0.40)/1,500 &= [\text{EBIT} - 0.10(\$30,000)](1 - 0.40)/1,100 \\ \text{EBIT} &= \$5,750 \end{aligned}$$

The break-even levels of EBIT do not change because the addition of taxes reduces the income of all three plans by the same percentage; therefore, they do not change relative to one another.

- 16.9 a.** The rate of return earned will be the dividend yield. The company has debt, so it must make an interest payment. The net income for the company is:

$$\begin{aligned} \text{NI} &= \$95,000 - 0.10(\$400,000) \\ \text{NI} &= \$55,000 \end{aligned}$$

The investor will receive dividends in proportion to the percentage of the company's shares they own. The total dividends received by the shareholder will be:

$$\text{Dividends received} = \$55,000(\$30,000/\$400,000)$$

$$\text{Dividends received} = \$4,125$$

So the return the shareholder expects is:

$$r_S = \$4,125/\$30,000$$

$$r_S = 0.1375 \text{ or } 13.75\%$$

- b. To generate exactly the same cash flows in the other company, the shareholder needs to match the capital structure of ABC. The shareholder should sell all shares in XYZ. This will net \$30,000. The shareholder should then borrow \$30,000. This will create an interest cash flow of:

$$\text{Interest cash flow} = 0.10(-\$30,000)$$

$$\text{Interest cash flow} = -\$3,000$$

The investor should then use the proceeds of the stock sale and the loan to buy shares in ABC. The investor will receive dividends in proportion to the percentage of the company's share they own. The total dividends received by the shareholder will be:

$$\text{Dividends received} = \$95,000(\$60,000/\$800,000)$$

$$\text{Dividends received} = \$7,125$$

The total cash flow for the shareholder will be:

$$\text{Total cash flow} = \$7,300 - 3,000$$

$$\text{Total cash flow} = \$4,125$$

The shareholders return in this case will be:

$$r_S = \$4,125/\$30,000$$

$$r_S = 0.1375 \text{ or } 13.75\%$$

- c. ABC is an all equity company, so:

$$r_S = r_0 = \$95,000/\$800,000$$

$$r_S = 0.1188 \text{ or } 11.88\%$$

To find the cost of equity for XYZ, we need to use M&M Proposition II, so:

$$r_S = r_0 + (r_0 - r_B)(B/S)(1 - t_c)$$

$$r_S = 0.1188 + (0.1188 - 0.10)(1)(1)$$

$$r_S = 0.1375 \text{ or } 13.75\%$$

- d. To find the WACC for each company, we need to use the WACC equation:

$$\text{WACC} = (S/V) r_S + (B/V) r_B (1 - t_C)$$

So, for ABC, the WACC is:

$$\begin{aligned}\text{WACC} &= (1)(0.1188) + (0)(0.10) \\ \text{WACC} &= 0.1188 \text{ or } 11.88\%\end{aligned}$$

And for XYZ, the WACC is:

$$\begin{aligned}\text{WACC} &= (1/2)(0.1375) + (1/2)(0.10) \\ \text{WACC} &= 0.1188 \text{ or } 11.88\%\end{aligned}$$

When there are no corporate taxes, the cost of capital for the firm is unaffected by the capital structure; this is M&M Proposition I without taxes.

- 16.13a.** For an all-equity financed company:

$$\text{WACC} = r_0 = r_S = 0.11 \text{ or } 11\%$$

- b. To find the cost of equity for the company with leverage, we need to use M&M Proposition II with taxes, so:

$$\begin{aligned}r_S &= r_0 + (r_0 - r_B)(B/S)(1 - t_C) \\ r_S &= 0.11 + (0.11 - 0.07)(0.25/0.75)(1 - 0.35) \\ r_S &= 0.1187 \text{ or } 11.87\%\end{aligned}$$

- c. Using M&M Proposition II with taxes again, we get:

$$\begin{aligned}r_S &= r_0 + (r_0 - r_B)(B/S)(1 - t_C) \\ r_S &= 0.11 + (0.11 - 0.07)(0.50/0.50)(1 - 0.35) \\ r_S &= 0.1360 \text{ or } 13.60\%\end{aligned}$$

d. The WACC with 25 percent debt is:

$$\begin{aligned} \text{WACC} &= (S/V) r_S + (B/V) r_B (1 - t_C) \\ \text{WACC} &= 0.75(0.1187) + 0.25(0.07)(1 - 0.35) \\ \text{WACC} &= 0.1004 \text{ or } 10.04\% \end{aligned}$$

And the WACC with 50 percent debt is:

$$\begin{aligned} \text{WACC} &= (S/V) r_S + (B/V) r_B (1 - t_C) \\ \text{WACC} &= 0.50(0.1360) + 0.50(0.07)(1 - 0.35) \\ \text{WACC} &= 0.0908 \text{ or } 9.08\% \end{aligned}$$