

Solutions to capital structure practice questions/problems

1. Debt-equity for all debt = $(\$0.4+0.5) / \$0.6 = 1.5$
 Debt-equity for all equity = $\$0.4 / (\$0.6+0.5) = 0.3636$

2.

	Firm A	Firm B
Discount rate for earnings stream	10%	12%
Discount rate for risk-free debt earnings	5%	8%
Earnings before additional interest	\$100	\$200
<i>Alternative 1</i>		
Debt/equity	0.0	0.0
Earnings after interest	\$100	\$100
Capitalization rate	0.10	0.12
Value of debt	\$0	\$0
Value of equity (EBT/discount rate)	<u>1,000</u>	<u>1,667</u>
Value of the firm (debt + equity)	\$1,000	\$1,667
<i>Alternative 2</i>		
Debt/equity	1.0	1.5
Earnings after interest	\$75	\$120
Capitalization rate	$0.10 + [(0.10 - 0.05)(1)] = 0.15$ $0.12 + [(0.12 - 0.08)0.04(1.5)] = 0.18$	
Value of debt	\$500	\$1,000.00
Value of equity (EBT/discount rate)	<u>\$500</u>	<u>666.67</u>
Value of the firm	\$1,000	\$1,666.67

3. Interest deductibility lowers the cost of using debt vis-à-vis equity financing. Therefore, companies have an incentive to use debt because its cost is much lower than that of equity.

4.

- a. Interest deductibility: makes the use of debt more attractive by lowering the cost of debt to the company.
- b. Likelihood of bankruptcy: the greater the probability of bankruptcy, the less debt that a company would want to take on.
- c. Limited liability: The fact the owners bear only a fixed amount of the risk on the downside of investments creates an incentive to take on riskier projects. This limit on the owners' liability encourages creditors to require a premium for bearing this risk.
- d. Net operating loss carryovers: If a company cannot use all of its tax benefits from interest, then the cost of debt is not as low as it could be if they could use these benefits; hence, the lack of profitability negates the benefits from interest deductibility. Therefore, companies that are not generating profits for tax purposes do not benefit from the tax deductibility of interest.

5.

a. Alternative 1 debt ratio = **0.25** Alternative 2 debt ratio = **0.67**

b.

	Alternative 1	Alternative 2
Income to claimants	\$30,000	\$30,000
Debt owners	\$10,000	\$20,000
Equity owners	\$20,000	\$10,000

c.

	Alternative 1	Alternative 2
Income to claimants	\$14,000	\$7,000
Debt owners	\$10,000	\$20,000
Equity owners	\$14,000	\$7,000
Government	\$6,000	\$3,000

d.

ABC Company: Evaluating financing alternatives

Without taxes

Alternative 1

Scenario	Operating earnings	Interest on debt	Net income	Probability	$p_n x_n$	$x_n - E(x)$	$(x_n - E(x))^2$	$p_n(x_n - E(x))^2$	
Good	\$50,000	\$10,000	\$40,000	25%	\$10,000	\$22,500	506,250,000	\$126,562,500	
Normal	\$30,000	\$10,000	\$20,000	50%	\$10,000	\$2,500	6,250,000	\$3,125,000	
Bad	\$0	\$10,000	(\$10,000)	25%	<u>-\$2,500</u>	-\$27,500	756,250,000	<u>\$189,062,500</u>	
E(x) =					\$17,500		$\sigma^2 =$	\$318,750,000	
								$\sigma =$	\$17,854
								Coefficient of variation =	1.020

Alternative 2

Good	\$50,000	\$20,000	\$30,000	25%	\$7,500	\$22,500	506,250,000	\$126,562,500	
Normal	\$30,000	\$20,000	\$10,000	50%	\$5,000	\$2,500	6,250,000	\$3,125,000	
Bad	\$0	\$20,000	(\$20,000)	25%	<u>-\$5,000</u>	-\$27,500	756,250,000	<u>\$189,062,500</u>	
E(x) =					\$7,500		$\sigma^2 =$	\$318,750,000	
								$\sigma =$	\$17,854
								Coefficient of variation =	2.380

With taxes

Alternative 1

Scenario	Operating earnings	Interest on debt	Net income after taxes	Probability	$p_n x_n$	$x_n - E(x)$	$(x_n - E(x))^2$	$p_n(x_n - E(x))^2$
Good	\$50,000	\$10,000	\$28,000	25%	\$7,000	\$15,750	248,062,500	\$62,015,625
Normal	\$30,000	\$10,000	\$14,000	50%	\$7,000	\$1,750	3,062,500	\$1,531,250
Bad	\$0	\$10,000	(\$7,000)	25%	<u>-\$1,750</u>	-\$19,250	370,562,500	<u>\$92,640,625</u>
				$E(x) =$	\$12,250		$\sigma^2 =$	\$156,187,500
							$\sigma =$	\$12,497
							Coefficient of variation =	1.020

Alternative 2

Good	\$50,000	\$20,000	\$21,000	25%	\$5,250	\$15,750	248,062,500	\$62,015,625
Normal	\$30,000	\$20,000	\$7,000	50%	\$3,500	\$1,750	3,062,500	\$1,531,250
Bad	\$0	\$20,000	(\$14,000)	25%	<u>-\$3,500</u>	-\$19,250	370,562,500	<u>\$92,640,625</u>
				$E(x) =$	\$5,250		$\sigma^2 =$	\$156,187,500
							$\sigma =$	\$12,497
							Coefficient of variation =	2.380