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Homework 5

Question 1:

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a)

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Initial Investment	-$2,000					$300
Acc. Dep.		$340	$680	$1,020	$1,360	$1,700
Adjusted Basis		$1,660	$1,320	$980	$640	$300
Opp. Cost		-$400	-$400	-$400	-$400	-$400
NWC	$50	$50	$50	$50	$50	
ΔNWC	-$50					$50
Invstmnt Cash Flow	-$2,050	-$400	-$400	-$400	-$400	-$350
Revenue		$21,500	$21,500	$21,500	$25,500	$25,500
Operating Costs		-$5,640	-$5,640	-$5,640	-$6,840	-$6,840
Depreciation		-$340	-$340	-$340	-$340	-$340
Pre-tax Income		$15,520	$15,520	$15,520	$18,320	$18,320
Taxes (0.2)		-$3,104	-$3,104	-$3,104	-$3,664	-$3,664
Net Income		$12,416	$12,416	$12,416	$14,656	$14,656

If Project C is Picked Up

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Sales Revenue		$21,500	$21,500	$21,500	$25,500	$25,500
Operating Costs		-$5,640	-$5,640	-$5,640	-$6,840	-$6,840

Taxes (0.2)		-$3,104	-$3,104	-$3,104	-$3,664	-$3,664
OCF		$12,756	$12,756	$12,756	$14,996	$14,996
Invstmnt Cash Flow	-$2,050	-$400	-$400	-$400	-$400	-$350
Total Cash Flow	-$2,050	$12,356	$12,356	$12,356	$14,596	$14,646
NPV	$58,712					

If Project C is NOT Picked Up

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5
Sales Revenue		$15,000	$15,000	$15,000	$15,000	$15,000
Operating Costs		-$3,600	-$3,600	-$3,600	-$3,600	-$3,600
Taxes (0.2)		-$2,280	-$2,280	-$2,280	-$2,280	-$2,280
OCF		$9,120	$9,120	$9,120	$9,120	$9,120
NPV	$39,484					

Project C should be picked up, since the scenario where project C is picked up has a significantly higher NPV than the scenario where it isn't picked up.

b)

By definition of the financial break-even point, we know that it is the point at which the NPV of the project is equal to 0. Since the NPV of the company before and after taking project C is positive, we know that the company must be producing above the financial break-even point.

Question 2:

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a)

$$PI = \frac{\text{Total PV of Future Cash Flows}}{\text{Initial Investment}}$$

$$PV_A = \frac{310}{1.14} + \frac{430}{1.14^2} + \frac{330}{1.14^3}$$
$$PV_A = \$825.54$$

$$PV_B = \frac{1,200}{1.14} + \frac{760}{1.14^2} + \frac{850}{1.14^3}$$
$$PV_B = \$2211.15$$

$$PI_A = \frac{825.54}{750} = 1.10$$
$$PI_B = \frac{2211.15}{2100} = 1.05$$

You would accept projects A and B since the budget is not of concern and both have a profitability index of greater than 1.

b)
You would pick project A, since it has a higher profitability index than project B, despite the fact that project B actually has a higher NPV than project A.

c)
You would pick project A, since the incremental profitability index of C over A is less than 1. Without more information regarding project C, it is impossible to tell if project C is better or worse than the market.

Question 3:

Accounting Break-Even Point:

$$\text{Accounting Profit Break-Even Point} = \frac{\text{FC} + \text{Dep}}{\text{Sales Price} - \text{Variable Costs}}$$

$$240,000 = \frac{\text{FC}_i + \text{Dep}}{84 - 24}$$

$$240,000 = \frac{\text{FC}_i + \text{Dep}}{60}$$

$$\text{FC}_i + \text{Dep} = 14,400,000$$

$$\text{BEP}_f = \frac{\text{FC}_f + \text{Dep}}{\text{Sales Price} - \text{Variable Costs}}$$

$$\text{FC}_f = \text{FC}_i + 1,200,000$$

$$\text{BEP}_f = \frac{15,600,000}{60}$$

$$\text{BEP}_f = 260,000$$

Financial Break-Even Point:

$$\text{Financial Profit Break-Even Point} = \frac{\text{EAC} + \text{FC} \times (1-t) - \text{Dep} \times t}{(\text{Sales Price} - \text{Variable Costs}) \times (1-t)}$$

$$280,000 = \frac{\text{EAC} + \text{FC}_i \times (1-t) - \text{Dep} \times t}{60 \times (1-t)}$$

$$16,800,000 = \frac{\text{EAC} + \text{FC}_i \times (1-t) - \text{Dep} \times t}{(1-t)}$$

$$16,800,000 = \frac{\text{EAC}}{1-t} + \text{FC}_i - \frac{\text{Dep} \times t}{(1-t)}$$

$$\text{FC}_i = 16,800,000 - \frac{\text{EAC}}{1-t} + \frac{\text{Dep} \times t}{(1-t)}$$

$$\text{BEP}_f = \frac{\text{EAC} + \text{FC}_f \times (1-t) - \text{Dep} \times t}{(\text{Sales Price} - \text{Variable Costs}) \times (1-t)}$$

$$60 \times \text{BEP}_f = \frac{\text{EAC} + \text{FC}_f \times (1-t) - \text{Dep} \times t}{(1-t)}$$

$$\text{FC}_f = 60 \times \text{BEP}_f - \frac{\text{EAC}}{1-t} + \frac{\text{Dep} \times t}{(1-t)}$$

$$\text{FC}_f = \text{FC}_i + 1,200,000$$

$$\text{FC}_i + 1,200,000 = 60 \times \text{BEP}_f - \frac{\text{EAC}}{1-t} + \frac{\text{Dep} \times t}{(1-t)}$$

$$16,800,000 - \frac{\text{EAC}}{1-t} + \frac{\text{Dep} \times t}{(1-t)} + 1,200,000 = 60 \times \text{BEP}_f - \frac{\text{EAC}}{1-t} + \frac{\text{Dep} \times t}{(1-t)}$$

$$18,000,000 = 60 \times \text{BEP}_f$$

$$\text{BEP}_f = 300,000$$

Question 4:

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https://docs.google.com/spreadsheets/d/12PGbdkDxJRim4Siq6abbTo6xQwVOuTxAA5HfJIs_sV8/edit?usp=sharing

Estimation of X (from 1000 simulations): $23,675,395.78

Question 5:

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4 year bond; 10% CR; $1000 FV; 9% current yield today (2 years after issue date)
1000x10% CR =$100 payments

Current price = 1000(1/1.09)^2 + 100[(1-(1/1.09)^2) / 0.09] = $1017.59

a)
Current yield = (coupon payment/ current price)x100 = (200/1017.59)x100 = 19.65%

b)
Capital gain yield = (capital gain/ current price)x100 = ((1017.59-1000)/1017.59)x100 = 1.73%

Question 6:

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a)
CR > MR
PV = 1223.30
$100 per coupon payment
(10,000 bonds)x($1223.30 price per bond) = $12,233,000

b)
CR = MR par value
BV = $1000
$12,233,000 / $1000 = 12,233 bonds

c)
We would be supporting the board member who makes this suggestion because coupon rate > market rate would resemble a premium. The bond value would only continue to decrease in value over time which signals a better decision to sell earlier on before devaluation continues further. Thus, the company would be saving money on interests.

PV savings = annuity*(1- 1/1.06^7) / 0.06 = 1,485,000
Where annuity = .01(10,000,000) - .06(12,233)(1000) = 266,000