FIN5FMA – FINANCIAL MANAGEMENT

Tutorial 2 Solutions

Question 1

Explain the following with examples

a. Opportunity cost
   The cost of forgoing an opportunity while undertaking a project.
b. Sunk Cost
   Sunk cost is a cost that has already occurred. They cannot be changed by the decision to accept or reject the project.
c. Salvage Value
   The selling value of an asset when it is disposed of is called salvage value.
d. Nominal Vs real cash flow
   Nominal cash flow refers to the actual dollars to be received or paid out. Real cash flow refers to the cash flow's purchasing power.

Question 2

The Best Manufacturing Company is considering a new investment. Financial projections for the investment are tabulated here. The corporate tax rate is 34 percent. Assume all sales revenue is received in cash, all operating costs and income taxes are paid in cash, and all cash flows occur at the end of the year. All net working capital is recovered at the end of the project.

	Year 0	Year 1	Year 2	Year 3	Year 4
Investment	$24000				
Sales revenue		$12500	$13,000	$13,500	$10,500
Operating costs		2,700	2,800	2,900	2,100
Depreciation		6,000	6,000	6,000	6,000
Net working capital	300	350	400	300	?

a. Compute the incremental net income of the investment for each year.
b. Compute the incremental cash flows of the investment each year.
c. Suppose the appropriate discount rate is 12 percent. What is the NPV of the project?

We will use the bottom-up approach to calculate the operating cash flow for each year. We also must be sure to include the net working capital cash flows each year. So, the net income and total cash flow each year will be:

	Year 0	Year 1	Year 2	Year 3	Year 4
Inflow:					
Sales		12,500	13,000	13,500	10,500
Operating cost		(2,700)	(2,800)	(2,900)	(2,100)
Depreciation		(6,000)	(6,000)	(6,000)	(6,000)
EBT		3,800	4,200	4,600	2,400
Tax (34%)		(1292)	(1428)	(1564)	(816)
Net income		2508	2772	3036	1584
+ Depreciation		6,000	6,000	6,000	6,000
Working capital recovered					1,350
Total cash inflow		8508	8772	9036	8934
Outflow:					
Investment	(24,000)				
Working capital	(300)	(350)	(400)	(300)	
Incremental cash flow	(24,300)	8158	8372	8,736	8934

$$NPV: -24{,}300 + \frac{8158}{1.12} + \frac{8372}{(1.12)^2} + \frac{8736}{(1.12)^3} + \frac{8934}{(1.12)^4} = 1553.87$$

Question 3

Pilot Plus Pens would like to decide whether it should replace its old machine today or after 5 years. The machine's current salvage value is $2.2 million. Its current book value is $1.4 million. If not sold, the old machine will require maintenance costs of $845,000 at the end of the year for next five years. Depreciation on the old machine is $280,000 per year. At the end of 5 years, it will have a salvage value of $120,000 and a book value of $0. A replacement machine costs $4.3 million now and requires maintenance costs of $330,000 at the end of year during its economic life of 5 years. At the end of five years, the new machine will have a salvage value of 800,000. It will be fully depreciated by the straight-line method. After five years a replacement machine will cost $3,200,000. The corporate tax is 40 percent and the appropriate discount rate is 8 percent. The company is assumed to earn enough revenues to generate tax shields from depreciation. Should Pilot plus Pens replace the old machine now or at the end of 5 years?

Old machine:	
Current market value	2,200,000
Current book value	1,400,000
Annual maintenance	845,000
Depreciation	280,000
Salvage value in 5 years	120,000
Book value in 5 years	-

New Machine	
Cost	4,300,000
Annual maintenance	330,000
Salvage value	800,000
Replacement machine cost in 5 years	3,200,000

Incremental approach to analyse the replacement decision.

Tax rate: 40%

Required rate of return: 8%

	Buy new machine:	Keep old machine:	Difference
Initial cash outlay			
Buy new machine	(4,300,000)		(4,300,000)
Lost sale of old machine		(2,200,000)	2,200,000
Lost taxes on Capital Gain (2.2-1.4)*0.4		320,000	(320,000)
Total	(4,300,000)	(1,880,000)	(2,420,000)

	Buy new machine:	Keep old machine:	Differential:
Maintenance cost	$ (330,000)	$ (845,000)	$ 515,000
Depreciation	(860,000)	(280,000)	(580,000)
EBT	$ (1,190,000)	$ (1,125,000)	$ (65,000)
Taxes 40%	476,000	450,000	26,000
Net income	$ (714,000)	$ (675,000)	$ (39,000)
Add back: depreciation	860,000	280,000	580,000
OCF	$ 146,000	$ (395,000)	$ 541,000
After tax salvage value			
Sell machine	$ 800,000		$ 800,000
Taxes	(320,000)		(320,000)
Lost sale of old	-	$ 120,000	(120,000)
Savings on Taxes lost sale of old machine		$ (48,000)	48,000
Total	**$ 480,000**	**$ 72,000**	**$ 408,000**
NPV	$ (3,390,384.40)	$ (3,408,118.47)	17,734.07

Incremental cash flow analysis is the change in cash flows from the existing machine to the new machine. In this type of analysis, the initial cash outlay would be the cost of the new machine, and the cash inflow (including any applicable taxes) of selling the old machine. In this case, the initial cash flow under this method would be:

Purchase new machine	–$4,300,000
Sale of old machine	2,200,000
Taxes on Sale of old machine	–320,000
Total	–$2,420,000

The cash flows from purchasing the new machine would be the difference in the operating expenses. We would also need to include the change in depreciation. The old machine has a depreciation of $280,000 per year, and the new machine has a depreciation of $860,000 per year, so the increased depreciation will be $580,000 per year.

The salvage value of the differential cash flow approach is more complicated. The company will sell the new machine and incur taxes on the sale in five years. However, we must also include the lost sale of the old machine. Since we sold the old machine in year zero, we lose the ability to sell the machine in five years. This is an opportunity lost that must be accounted for. So, the salvage value is:

	Sell machine	$800,000
	Taxes	–320,000
	Lost sale of old	–120,000
	Taxes on lost sale of old	48,000
	Total	$408,000

The NPV under this method is:

NPV = –$2,420,000 + $541,000(PVIFA8%,5) + $408,000 / $(1.08)^5$

NPV = $17,734.07

So, this analysis tells us the company should purchase the new machine.

We can also calculate the NPVs (a) to keep the old machine and (b) buying the new machine separately, then compare the NPVs.

If we keep the old machine, we will give up the opportunity of selling it for 2.2 million. That is an opportunity cost in year 0. At the same time, we don't need to pay a tax on the capital gain on disposal of the machine [(2,200,000-1,400,000) x .40] = 320,000. The net cost in year 0 for the option of keeping the old machine = -2,200,000 + 320,000 = -1,880,000

NPV of keeping old Machine = –$1,880,000 - $395,000(PVIFA8%,5) + $72,000/$(1.08)^5$

= -3,408,118.47

NPV of buying Machine = –$4,300,000 + $146,000(PVIFA8%,5) + $480,000/$(1.08)^5$

= -3,390,384.40

You should buy the new machine since the NPV to buy the new machine is less negative.

Note that the NPV of the differential cash flow method is the same as the difference between the NPVs of the individual decision we calculated, that is:

Buy new machine -	$	(3,390,384.40)
Keep old machine	$	(3,408,118.47)
Difference:	$	17,734.07

Either method will give you the same answer.