

Problem 8-10

Goal: Determine annual cash flows, MACRS depreciation, NPW, & IRR

Given: Chemical plant with following revenues and expenses

Time Zero investment	\$50,000,000	
Working Capital	\$7,500,000	
Year	Annual Revenue	Operating Expenses
1	\$7,000,000	\$4,000,000
2	\$10,000,000	\$5,600,000
3	\$15,000,000	\$6,800,000
4	\$20,000,000	\$7,800,000
5	\$22,500,000	\$8,800,000
6	\$24,000,000	\$9,600,000
7	\$25,000,000	\$10,000,000

MACRS 5 year property class

NPW interest rate 15.0%

Approach: Prepare a cashflow table from given data

Assume tax rate 35.0%

Assume negative taxes are a credit against other profitable projects

Alternate tax assumption - negative taxable income pays ZERO taxes

Assume NO recovery of working capital, $rec_i = 0$

Determine Net Present Worth at 15% (use Excel NPV function)

Calculations:

Year	MACRS Rate	Amount Depreciated	S-C	Taxes	Cash Flow	Cash Flow <i>Alternate</i>
0					(\$50,000,000)	(\$50,000,000)
1	0.2	\$10,000,000	\$3,000,000	(\$2,450,000)	\$5,450,000	\$3,000,000
2	0.32	\$16,000,000	\$4,400,000	(\$4,060,000)	\$8,460,000	\$4,400,000
3	0.192	\$9,600,000	\$8,200,000	(\$490,000)	\$8,690,000	\$8,200,000
4	0.1152	\$5,760,000	\$12,200,000	\$2,254,000	\$9,946,000	\$9,946,000
5	0.1152	\$5,760,000	\$13,700,000	\$2,779,000	\$10,921,000	\$10,921,000
6	0.0576	\$2,880,000	\$14,400,000	\$4,032,000	\$10,368,000	\$10,368,000
7		\$0	\$15,000,000	\$5,250,000	\$9,750,000	\$9,750,000
summation checks	1.00	\$50,000,000	\$70,900,000	\$7,315,000	\$13,585,000	\$6,585,000

Answer a.)

Answer b.)

Answer c.)

Discussion:

(\$13,885,995) = -50,000,000 + NPV(0.15, cash flow)

5.90% = IRR(cash flow)

NPW at textbook solution 3.5% IRR rate **\$4,961,423**

(\$19,408,556)

2.74%

prepared by: D. C. Drown
10/23/2008

Problem 8-10 *Excel* Financial Functions Demonstration

Goal: Determine annual cash flows, MACRS depreciation, NPW, & IRR

Given: Chemical plant with following revenues and expenses

Time Zero investment \$50,000,000
 NPW interest rate 15.0% 5.89593%

Year	Cash Flow	Discounted	Cumulative @ 15%	Cumulative @ 5.9%
0	(\$50,000,000)	(\$50,000,000)	(\$50,000,000)	(\$50,000,000)
1	\$5,450,000	\$4,739,130	(\$45,260,870)	\$5,146,562
2	\$8,460,000	\$6,396,975	(\$38,863,894)	\$7,544,176
3	\$8,690,000	\$5,713,816	(\$33,150,078)	\$7,317,824
4	\$9,946,000	\$5,686,658	(\$27,463,420)	\$7,909,179
5	\$10,921,000	\$5,429,667	(\$22,033,753)	\$8,200,986
6	\$10,368,000	\$4,482,373	(\$17,551,381)	\$7,352,235
7	\$9,750,000	\$3,665,386	(\$13,885,995)	\$6,529,046
summation checks	\$13,585,000	(\$13,885,995)		\$8

Present Worth check:

(\$7,856)

\$8

(\$13,885,995) = -50,000,000 + NPV(0.15,cash flow) = C10 + NPV(E7,C11:C17)

5.90% = IRR(cash flow, guess i) = IRR(C10:C17,0.035)

5.89593% = IRR(cash flow) = IRR(C10:C17)

Discussion:

round off of 0.004% in IRR produces a \$7,800 change in NPW result

\$7,800 might seem significantly different than zero, but is only 0.016% of original capital investment

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10/18/2006

Discounted = Cash Flow / (1+0.15)^year = C11 / (1+\$E\$7)^B11

Problem 8-10 Cash Flow Analysis

