

MIT SLOAN SCHOOL OF MANAGEMENT

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Problem Set 9: Capital budgeting
Due: December 9, 2003

1. The NPV calculation is:

\$ thousands	0	1	2	3	4	5	6	7	8
Sales		4200.0	4410.0	4603.5	4862.0	5105.1	5360.4	5628.4	5909.8
Man. Costs		3780.0	3969.0	4167.5	4375.8	4594.6	4824.3	3065.6	5318.8
Depreciation		120	120	120	120	120	120	120	120
Rent		100.0	104.0	108.2	112.5	117.0	121.7	126.5	131.6
Sale of Plant									400.00
BV of Plant	1200	1080	960	840	720	600	480	360	240
EBT		200.0	217.0	234.9	253.7	273.5	294.4	316.3	499.4
Taxes		70.0	76.0	82.2	88.8	95.7	103.0	110.7	174.8
Working Capital	350.0	420.0	441.0	463.1	486.2	510.5	536.0	562.8	0
Cashflow									
Inflow		4200.0	4410.0	4603.5	4862.0	5105.1	5360.4	5628.4	6309.8
Exp. w/o Dep.		3950.0	4149.0	4357.8	4577.1	4807.3	5049.0	5302.8	5625.2
Increase in W.C.	350.0	70.0	21.0	22.1	23.2	24.3	25.5	26.8	-562.8
Initial Investment	1200.0								
Sales of Plant									400.0
Tax on Sale									56.0
Net Cash Flow	-1550	180.0	240.1	250.6	261.8	273.5	285.8	298.8	1247.4
NPV	85.796								

2. Assume the following:

- The firm will manufacture for at least 10 years
- There will be no inflation or technological change
- The 15 percent cost of capital is appropriate for all cash flows and is a real, after-tax rate of return
- All operating flows occur at the end of the year.
- Depreciation follows the MACRS schedule in the textbook.

Purchasing lids - The net present value of the after-tax cost is:

$$NPV(\text{purchase}) = - \sum_{t=1}^{10} \frac{(2)(200000)(1 - .35)}{1.15^t} = -\$1,304,880$$

Manufacturing lids - The cashflow schedule is shown below. Amounts are in hundred thousands.

	0	1	2	3	4	5	6	7	8	9	10
Cost		-3	-3	-3	-3	-3	-3	-3	-3	-3	-3
Depreciation		0.21	0.37	0.26	0.19	0.13	0.13	0.13	0.07		
Total Cost		-3.21	-3.37	-3.26	-3.19	-3.13	-3.13	-3.13	-3.07	-3	-3
Tax Shield		-1.13	-1.18	-1.14	-1.12	-1.10	-1.10	-1.10	-1.07	-1.05	-1.05
Investment	-1.5										
Δ Working Capital	-3										.3
Free Cash Flow	-1.8	-1.875	-1.875	-1.875	-1.875	-1.875	-1.875	-1.875	-1.95	-1.95	-1.65

So, the net present value of the investment is $-\$1,118,328$.

The firm should make the lids.