Chapter Ten

Making Capital Investment Decisions

Key Concepts and Skills

- Understand how to determine the relevant cash flows for various types of proposed investment projects
- Be able to compute the CCA tax shield
- Understand the various methods for computing operating cash flow

Relevant Cash Flows

- The cash flows to be included in capital budgeting analysis are those that will only occur if the project is accepted
- These cash flows are called *incremental cash flows*
- In most cases, the *stand-alone principle* allows us to analyze a project in isolation from the firm simply by focusing on incremental cash flows

Project Evaluation Elements

- Sunk costs – costs that have been incurred in the past; irrelevant
- Opportunity costs – costs of lost options
- Side effects
  - Positive side effects – benefits to other projects
  - Negative side effects – costs to other projects
- Changes in net working capital
- Financing costs; irrelevant
- Capital Cost Allowance (CCA); tax shields
- Inflation; important effect on tax shields

Methods for Computing OCF

- Top-Down Approach
  - OCF = Sales – Cash Costs – Taxes
  - Non-cash deductions are ignored
- Bottom-Up Approach
  - OCF = NI + Depreciation + Other tax deductions
  - Interest on debt is ignored
- Tax Shield Approach
  - OCF = (Sales – Cash Costs) (1 – T) + (Depreciation + Other tax deductions) (T)

Example – Pro-forma Approach

Majestic Mulch and Compost Company

Project: Produce and sell power mulchers

PROJECT SPECIFICATIONS

Capital expenditure ($)	800 000
Annual operating expenses	
Fixed ($)	25 000
Variable ($)	60
Salvage value ($)	150 000

Projected sales volume and unit selling price ($)

Year	Volume	Price
1	3000	120
2	5000	120
3	6000	120
4	6500	110
5	6000	110
6	5000	110
7	4000	110
8	3000	110

Working capital ($)

Initially $20 000,
rising to 15% of sales revenue

Required return on investment

15%

CCA SCHEDULE (DB @ 20%)

Year	Start balance	CCA	End balance
1	400 000	80 000	320 000
2	720 000	144 000	576 000
3	576 000	115 200	460 800
4	460 800	92 160	368 640
5	368 640	73 728	294 912
6	294 912	58 982	235 930
7	235 930	47 186	188 744
8	188 744	37 749	150 995

PROJECTED INCOME STATEMENTS

Year	1	2	3	4	5	6	7	8
Revenue	360 000	600 000	720 000	715 000	660 000	550 000	440 000	330 000
Fixed costs	25 000	25 000	25 000	25 000	25 000	25 000	25 000	25 000
Variable costs	180 000	300 000	360 000	390 000	360 000	300 000	240 000	180 000
CCA	80 000	144 000	115 200	92 160	73 728	58 982	47 186	37 749
EBIT	75 000	131 000	219 800	207 840	201 272	166 018	127 814	87 251
Taxes @ 40%	30 000	52 400	87 920	83 136	80 509	66 407	51 126	34 901
Net income	45 000	78 600	131 880	124 704	120 763	99 611	76 688	52 351

PROJECTED OPERATING CASH FLOWS

Year	1	2	3	4	5	6	7	8
EBIT	75 000	131 000	219 800	207 840	201 272	166 018	127 814	87 251
+ CCA	80 000	144 000	115 200	92 160	73 728	58 982	47 186	37 749
- Taxes	30 000	52 400	87 920	83 136	80 509	66 407	51 126	34 901
Operating cash flow	125 000	222 600	247 080	216 864	194 491	158 593	123 874	90 099

OCF_1 = Revenue - Cash costs - Taxes
= 360 000 - 205 000 - 30 000 = 125 000

= Net income + Depreciation
= 45 000 + 80 000 = 125 000

WORKING CAPITAL REQUIREMENTS

Year	Revenue	Working capital	Change
Time 0		20 000	20 000
1	360 000	54 000	34 000
2	600 000	90 000	36 000
3	720 000	108 000	18 000
4	715 000	107 250	-750
5	660 000	99 000	-8 250
6	550 000	82 500	-16 500
7	440 000	66 000	-16 500
8	330 000	49 500	-16 500

PROJECTED CASH FLOWS

Year	Time 0	1	2	3	4	5	6	7	8
Operating cash flow		125 000	222 600	247 080	216 864	194 491	158 593	123 874	90 099
Working capital	20 000	34 000	36 000	18 000	-750	-8 250	-16 500	-16 500	-16 500
WC recovery									-49 500
Capital expenditure	800 000								
Salvage value									150 000
Cash flow	-820 000	91 000	186 600	229 080	217 614	202 741	175 093	140 374	306 099
PV @15%	-820 000	79 130	141 096	150 624	124 422	100 798	75 698	52 772	100 064
SUM	**4 604**								

Tax Shield Approach in Project Evaluation

Example of the Effect of Tax Shields

Equipment is purchased for $100 000 and it costs $10 000 to have it delivered and installed. Based on past information, it is expected that the equipment can be sold for $17 000 at the end of its useful life of 6 years. The marginal corporate tax rate is 40%. If the applicable CCA rate is 20% and the required return on this project is 10%, what is the present value of the CCA tax shields?

$$\text{PV of CCA tax shields} = \frac{CdT_c}{d+k} \times \frac{1+0.5k}{1+k} - \frac{SdT_c}{d+k} \times \frac{1}{(1+k)^n}$$

in which:

- C = Capital expenditure
- d = CCA depreciation rate
- T_c = Corporate tax rate
- k = discount rate
- S = Salvage value
- n = Time at which salvage value is realised

The delivery and installation costs are capitalized in the cost of the equipment.

$$\text{PV of tax shields on CCA} = \frac{110\ 000 \times 0.20 \times 0.40}{0.20 + 0.10} \times \frac{1 + 0.5 \times 0.10}{1 + 0.10} -$$

$$\frac{17\ 000 \times 0.20 \times 0.40}{0.20 + 0.10} \times \frac{1}{(1 + 0.10)^6}$$

$$= 25\ 441.05$$

Thus, it can be said that the "equivalent" after-tax capital expenditure at the time of purchase is:

110 000 - 25 441.05 = $84 558.95

Example – Tax Shield Approach

Majestic Mulch and Compost Company

TAX SHIELD APPROACH

Year	Time 0	1	2	3	4	5	6	7	8
Revenue		360 000	600 000	720 000	715 000	660 000	550 000	440 000	330 000
Operating expenses		205 000	325 000	385 000	415 000	385 000	325 000	265 000	205 000
Operating profit		155 000	275 000	335 000	300 000	275 000	225 000	175 000	125 000
A-T Oper. Profit		93 000	165 000	201 000	180 000	165 000	135 000	105 000	75 000
CCA		80 000	144 000	115 200	92 160	73 728	58 982	47 186	37 749
Tax shield		32 000	57 600	46 080	36 864	29 491	23 593	18 874	15 099
Working capital	20 000	34 000	36 000	18 000	-750	-8 250	-16 500	-16 500	-66 000
Capital expenditure	800 000								-150 000
Cash flow	-820 000	91 000	186 600	229 080	217 614	202 741	175 093	140 374	306 099
PV @15%	-820 000	79 130	141 096	150 624	124 422	100 798	75 698	52 772	100 064
SUM	**4 604**								

Example – Tax Shields by Component

PV of revenues	2 488 152
PV of operating expenses	1 412 987
PV of working capital	49 179
PV of capital expenditure	750 965

PV of tax shields on capital expenditure

$$[\ 800\,000\ (0.2)\ (0.4)\ /\ (0.2 + 0.15)\ ]\ (1.075\ /\ 1.15) = 170\,932$$

PV of tax shields on salvage value

$$[\ 150\,000\ (0.2)\ (0.4)\ /\ (0.2 + 0.15)\ ]\ /\ (1.15)^{8} = 11\,208$$

Overall PV

$$(2\,488\,152 - 1\,412\,987)\ (1 - 0.4) - 49\,179 - 750\,965 + 170\,932 - 11\,208 = 4679$$

Why is this value ($4679) different from that obtained by the pro-format approaches ($4604)?

A salvage value of $150000 is used in the pro-format approach instead of the UCC of $150 995. By subtracting the PV of tax shields on a salvage value of $150 000 from those on the capital expenditure, it is assumed implicitly that the additional $995 of UCC generates tax shields beyond the life of the project. The PV of these is:

$$[\ 995\ (0.2)\ (0.4)\ /\ (0.2 + 0.15)\ ]\ /\ (1.15)^{8} = 74$$

Thus, the correct overall PV is that obtained by the component approach, i.e. $4679, because it accounts for the tax shields beyond the life of the project.