9. Capital Budgeting. Special Issues

Problem 46

The X-Power Coal Company is considering a strip-mining project that requires a $120,000 initial outlay and will generate cash inflows from operations of $50,000 at the end of each of the next ten years. At the end of the tenth year, a $300,000 expenditure will be necessary to restore the land environmentally.

(a) Find the net present value of the strip-mining project if the discount rate is 0%, 5%, 10%, 15%, 20%, 25%, 30%, and 35%.

(b) What can be said about the uniqueness of the IRR of this project?

(c) Would you accept this project if the required rate of return was 5%? 20%? 40%?

Solution

0	1	2	3	4	5	6	7	8
-120,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	-250,000

Excel function =NPV(rate;$B$20:$L$20)*(1+rate)

rate	NPV
0%	-20,000
5%	0,109
10%	6,794
15%	6,296
20%	2,088
25%	-3,886
30%	-10,542
35%	-17,284

(b) The IRR is not unique. There is one IRR between 0% and 5% and one IRR between 20% and 25%.

4,96% Excel function =IRR($B$20:$L$20)

21,86% Excel function =IRR($B$20:$L$20;0,3)

(c) At 5% yes. At 20% yes. At 40% no.

Problem 47

You have to choose between two alternative investment plans.
Plan A requires an initial outlay of $100,000 and will generate annual cash flows of $20,000 during its 9-year life. At that time, its salvage value will be $18,000. Plan B requires the initial outlay of $120,000 but will generate annual cash flows of $25,000 during its 9-year life. Its salvage value at the end of year 9 is estimated to be $0,000. Your firm uses a 12% WACC to value either project.
(a) Find the NPV of project A.
(b) Find the IRR of project A to the nearest tenth of a percent (using Excel).
(c) Find the NPV of project B.
(d) Find the IRR of project B to the nearest tenth of a percent (using Excel).
(e) Which project should you choose, and why?

Solution

Project A

0	1	2	3	4	5	6	7	8	9
-100,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	20,0	38,0

(a) NPV= 13,056 Excel function =NPV(12%;$B$30:$N$30)*(1+12%)
(b) IRR= 15,15% Excel function =IRR($B$30:$N$30)

Project B

0	1	2	3	4	5	6	7	8	9
-120,0	25,0	25,0	25,0	25,0	25,0	25,0	25,0	25,0	25,0

(c) NPV= 13,206
(d) IRR= 14,83%

(e) Project A-B

0	1	2	3	4	5	6	7	8	9
20,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	-5,000	13,000

IRR= 12,31%

Rate	NPV(A-B)	
10%	-1,002	
12%	0,000	
14%	0,945	

NPV(A-B) equals zero at the IRR, which is equal to 12,31%. Since NPV(A-B) increases as the discount rate increases, project B should be chosen for any discount

Problem 48

Piwnice Win S.A. purchased some French wine at a total expense of $100 000. The wine will become more valuable as it ages, with the following anticipated future values.

Year	Value	Year	Value
1	110 000	7	270 000
2	120 000	8	310 000
3	140 000	9	345 000
4	160 000	10	390 000
5	190 000	11	420 000
6	230 000	12	470 000

The required rate of return is 12%.

Calculate NPV for each of investment projects.

When should a company sell the wine if NPV criterion is used?

When should a company sell the wine if UAS criterion is used?

Solution

There are 12 mutually exlusive investment projects with different lives.

Net present value is calculated using formula:

$$NPV = -Z_o + \frac{S_t}{(1+i)^t}$$

where

Z_0 - purchase value in time t=0,

S_t - sales value in time t.

Net Present Value is the sum of discounted future payments (PMT):

$$NPV = \frac{PMT}{(1+i)^1} + \frac{PMT}{(1+i)^2} + ... + \frac{PMT}{(1+i)^n} = PMT * \frac{(1+i)^n - 1}{i*(1+i)^n}$$

So PMT is equal to:

$$PMT = PV \frac{i(1+i)^n}{(1+i)^n - 1} = PV \frac{i}{1-(1+i)^{-n}}$$

Year	NPV	PMT	Year	NPV	PMT
1	-1 786	-2 000	7	22 134	4 850
2	-4 337	-2 566	8	25 204	5 074
3	-351	-146	9	24 410	4 581
4	1 683	554	10	25 570	4 525
5	7 811	2 167	11	20 740	3 493
6	16 525	4 019	12	20 637	3 332

A company should sell the wine at the end of year 8.