Examen

Exercise Session 4: Investment Decisions

Exercise 1:

A firm wants to buy a new machine with the aim to increase the level of production. This machine costs 20.000 euros and it will generate cash flows by 4.000 euros each year for the next eight years thanks to the sales of the goods produced with it.

1) If the opportunity cost of capital is 9%, which is the *Net Present Value* (NPV) of this project? Do you advice the managers of this firm to invest in this new machine?
2) Which is the *Payback Period* and the *Discounted Payback Period* of this project?
3) If the opportunity cost of capital is 14%, which is the NPV of the project? Which conclusions can you draw?
4) Which is the maximum discounting rate that can be applied before we decide to renounce to this project? What represents it?

Exercise 2:

A firm wants to replace a machine that is arrived at the end of her lifetime. Two different new machines can be bought: a high quality one or a low cost one. Their technical features are reported in the following table:

Type of machine	Acquisition Cost (euros)	Lifetime (years)	Operating costs (per year)
High quality	15.000	10	5% of the acquisition cost
Low cost	10.000	7	7% of the acquisition cost

The low cost machine will have to be revised after 4 years at the cost of 4.000 euros. The opportunity cost of capital is 12%.

1) From the financial point of view and forgetting about taxation effects, which machine would you advice the managers to buy?

Exercise 3:

Here are exposed the forecasts for an investment project:

Year	1	2	3	4
Revenues	10.000	11.000	12.000	13.000
-COGS	4.000	4.400	4.800	5.200
-Depreciation	4.000	3.000	2.000	1.000
=EBIT	2.000	3.600	5.200	6.800

This project needs an initial investment of 15.000 euros in fixed assets (in year 0) and a further investment of 2.000 euros at the end of the second year.
The Net Working Capital for each year is estimated to be 10% of Revenues.
It is assumed that this need in working capital must be fully funded at the beginning of period and is recovered only at the end of 4 years.
The different Fixed Assets that have been bought will be resold at the end of the fourth year at their net book value without any capital gains.
The corporate tax rate is 40%.

1) Estimate the different Cash Flows related to this project;
2) If the opportunity cost of capital is 12%, what is the Net Present Value (NPV) of this project? Is it profitable to invest in this project?
3) What is the Internal Rate of Return (IRR) of this project?

EXERCISE 1:

a) What's the NPV?

$$NPV = I_0 + \sum DcF$$

$$= -20000 + 4000 \left[\frac{1 - (1+0,09)^{-8}}{0,09} \right] = 2139,28 €$$

NPV > 0 so we can invest

b) What's the PP and DPP?

$$PP = \frac{I_0}{DF} = \frac{20000}{4000} = 5 \text{ years to pay back}$$

$$DPP = I_0 + \sum DcF = -20000 + \left(\frac{4000}{(1+0,09)^t} \right)$$

$y_1 = 3669,72$; $y_2 = 3366,72$; $y_3 = 3088,73$

$y_4 = 2833,7$; $y_5 = 2599,73$; $y_6 = 2385,07$

$y_7 = 2188,14$; $y_8 = 2007,47$

$-20000 + y_1 + y_2 \dots$ At year 7 we have a + DPP (+ 131,81)

c) What's the NPV with CoC = 14%?

$$NPV = -20000 + 4000 \left[\frac{1 - (1+0,14)^{-8}}{0,14} \right] = -1444,54 €$$

d) What's the max discounting rate?

with 9% = 2139€ $\Big\{$ between 9 and 14%.

14% = -1444€

10% = 1339,7 ; 11% = 584,5 ; 12% = -129,44

11,5 = 222,5

→ 11,8 = 10,18%

EXERCISE 2:

$$PV_A = 15000 + (15000 \times 0,05) \cdot \left[\frac{1-(1+0,12)^{-10}}{0,12}\right] = 19237,67€$$

$$PV_B = 10000 + (10000 \times 0,07) \cdot \left[\frac{1-(1+0,12)^{-7}}{0,12}\right] + \frac{4000}{(1+0,12)^4} = 15736,7€$$

We would chose the B one but they both have a ≠ lifetime so to kill the time effect, we use the EAC

$$EAC = \frac{PV}{\frac{1}{i}\left[1-(1+i)^t\right]} \quad \begin{array}{l} = EAC_A = 3404,76€ \\ = EAC_B = 3448,19€. \end{array}$$

① EXERCISE 3:

a) $NPV = \Sigma DFCF$ $FCF = EBIT - taxes - CAPEX - \Delta NWC + Deprec.$

	0	1	2	3	4
EBIT	/	2000	3600	5200	6800
TAXES (40% of EBIT)	/	800	1440	2080	2720
Depreciat°	/	4000	3000	2000	1000

operating cf = EBIT - TAXES + DEPRECIAT°   ⊖ because you receive that amount.

CAPEX	15000	\	2000	\	↑ -7000

$NBV = $ value of machine - cumulated dep.
$= 17000 - 10000 = 7000$

NWC	1000	1100	1200	1300	/

fully funded at the beginning & completely recovered
at the end of the 4th year

	0	1	2	3	4
ΔNWC	1000	100	100	100	– 1300
FCF	–15000 –1000 ——— – 16000	5100	3060	5020	6800 – 2720 +1000 –(–7000) +(–1300) 13380

b) What's the NPV (COC = 12%)

$$NPV = -16000 + \frac{5100}{(1+0,12)^1} + \frac{3060}{(1+0,12)^2} \ldots = 3069,35€ > 0$$

c) What's the IRR?   (NPV = 0)

$$0 = -16000 + \frac{5100}{(1+IRR)^1} + \ldots$$

will be higher than 12% because the answer is
3069 € and is higher than 0)
$$IRR = 19,26\%$$