Investment and profitability

Task 1: Investment evaluation - cost comparison

- The static cost method is based on a comparison of operating and one-off costs. It is assumed that one variant has higher operating costs and the other one higher one-time costs, but does not differ in its revenues.

- *Task: We have to decide between two options of the same capacity investment. Option A has a one-off cost of CZK 250,000 and annual operating costs of CZK 160,000, variant B of CZK 300,000 and CZK 140,000. The expected life of both variants is 4 years.*

- **Task A: Compare the advantages of each alternative using absolute lifetime cost values.**

- **Task B: Assess the benefits of both investment options by calculating the payback period of additional investment costs dn.**

Task 1: Solution A

- Compare the benefits of each alternative with absolute lifetime cost values

- Option A will require costs over its lifetime:
  - 250,000 + 4 * 160,000 = $ 890,000

- Option B:
  - 300,000 + 4 * 140,000 = $ 860,000

Task 1: Solution of Question B

payback time dn = $\dfrac{N_J(B) - N_J(A)}{N_P(A) - N_P(B)}$

where: NPs are operating costs (see the difference as "profit" - cost difference)

NJ are one-time costs (see as an investment)

A, B - investment variants

Calculation: $dn = \dfrac{300 - 250}{160 - 140} = 2,5$

(50,000 (300-250) will be reimbursed in 2.5 years, while the investment will continue to operate for another 1.5 years)

Again, option B is more advantageous because the increased fixed costs of option B will be offset in 2.5 years with the cost of option A due to lower operating costs. Thus, after 2.5 years, the total cost of Option A will begin to exceed the total cost of Option B

Task 2

- Compare the advantages of individual investment alternatives by discounting future costs. Here's an example, with one-off costs being spent in 0 and costing capital at 14%.
- To calculate the calculation tables for the individual variants:

Year	Costs	Discont rate (14 %)	Disconted costs
0		1,0000	
1		0,8772	
2		0,7695	
...	...	...	...

Task 2

- Option A

Year	Costs	Discont rate	Disconted costs
0	250000	1	250000
1	160000	0,8772	140352
2	160000	0,7695	123120
3	160000	0,675	108000
4	160000	0,5921	94736

890 000   716208

Task 2

- Option B

Year	Costs	Discont rate	Disconted costs
0	300000	1	300000
1	140000	0,8772	122808
2	140000	0,7695	107730
3	140000	0,675	94500
4	140000	0,5921	82894

| | **860 000** | | **707932** |

Again, variant B (716208 for A vs. 707932 for B) is preferred. This is particularly useful when operating costs vary from year to year.

Task 3: **Evaluation of investment options - financial mathematical procedures**

- The streams of monetary expenditures and cash receipts are assessed up to the end of their economic life or to a certain planning horizon.

- *Task: There are two investment variants (A and B) for which the same capital expenditure is assumed to be CZK 1,000,000, but different distribution of annual net cash flows (see table). The cost of capital is 10%, the lifetime for both variants is the same (6 years). Compare these options.*

Task 3: Variants

Distribution of net income (cash flow) investment options A and B

Rok	Cah flow A	Cash flow B	Discont rate (10 %)	Discont rate (30 %)
0	-1000	-1000	1,000	1,000
1	300	100	0,909	0,769
2	600	200	0,826	0,592
3	400	300	0,751	0,455
4	300	400	0,683	0,350
5	200	500	0,620	0,269
6	100	600	0,564	0,207

900   1 100

Task 3: Task A

- Compare these investment options using the capital value method, ie using the transformation formula:

$$K = \sum_{t=o}^{n} \frac{(E_t - A_t)}{(1+i)^t}$$

where:

- K = the value of the capital of the investment option
- Et = cash receipts at the end of period t
- At = cash expenses at the end of period t
- (Et-At) = net revenue at the end of period t
- i = calculation interest rate
- t = period (t = 0.1, 2 ..... n)
- n = economic life of the investment object

Task 3: Solution A

It is about converting the values of future income to their present value – t0

K_A = -1 000 + 300 * 0,909 + 600 * 0,826 + 400 * 0,751 + 300 * 0,683 + 200 * 0,620 + 100 * 0,564 = 454

K_B = -1 000 + 100 * 0,909 + 200 * 0,826 + 300 * 0,751 + 400 * 0,683 + 500 * 0,620 + 600 * 0,564 = 403

- The capital value of both variants is positive, both variants are advantageous and provide more than 10% interest. Option A is preferable.

Profitability

Task 4: Profitability and liquidity in own resources financing

- Mr. Black has available cash of CZK 1,000,000 for his own funds. It offers an investment opportunity, which, when it costs 1,000,000, - CZK, as it is estimated, will give him the following one-off income with a different probability:

case	Cash flow(CZK)	probability %
(1)	1.500.000,-	5
(2)	1.115.000,-	50
(3)	1.040.000,-	30
(4)	800.000,-	10
(5)	0,- (total loss)	5

- How big is (1) - (5) the internal rate of return on investment, return on total capital and return on equity of Mr. Black?

Task 4: Solution

Individual cases show the following internal rate of return (r)

case	1	2	3	4	5
r	50%	11,5%	4%	-20%	-100%

- The total capital that Mr. Novák needs for this project is CZK 1,000,000, and the entire investment is therefore financed by equity. The internal rate of return is thus an expression of both the return on equity and total capital - in individual cases.

Task 5: Foreign funding, liquidity and bankruptcy

- *Unlike the previous example, Mr. Smith does not want to invest his own resources. He wants to borrow the required CZK 1,000,000.00 for a period of one year at an interest rate of 6%. The interest is to be repaid together with the loan per year in one installment.*

- *What result does Mr. Smith achieve in cases (1) - (5)?*

Task 5: **Solution**

- At interest rate on foreign capital 6% the debt is 1.060.000, - CZK. So Mr. black will achieve the following results (all in CZK)

case	Revenues v t_1	Payoff and interest rate	Result
(1)	1.500.000	1.060.000	+ 440.000
(2)	1.115.000	1.060.000	+ 55.000
(3)	1.040.000	1.060.000	-20.000
(4)	800.000	1.060.000	-260.000
(5)	0	1.060.000	-1.060.000

Task 6: Profitability, liquidity and bankruptcy in mixed financing in an individual enterprise

- As in Tasks 1 and 2, Mr. Black is offered an investment with an acquisition cost of CZK 1,000,000, while any number of such projects may be executed simultaneously. It has CZK 1,000,000 of its own resources.

- What profit or resp. losses will Mr. Black achieve from the current implementation of two projects in cases (1) - (5), when he uses one project for his own project and the second (same) loan project with 6% interest on foreign capital?

- How high is the return on equity for a given variety of results?

- What will be the wealth of Mr. Black?

Task 6 Results

- The overall result of both projects is the result of a project financed from own resources and the result of a loan-funded project (tasks (1 and 2) .The return on equity is calculated as the ratio of result and equity of CZK 1,000,000.

case	Profit/loss in CZK						SUM	ROE
	Own financing (Equity)			Foreign financing (loan)				
	Revenue	Cost	Result	Revenue	Cost	Result		
(1)	1.500.000	1.000.000	500.000	1.500.000	1.060.000	440.000	940.000	94%
(2)	1.115.000	1.000.000	115.000	1.115.000	1.060.000	55.000	170.000	17%
(3)	1.040.000	1.000.000	40.000	1.040.000	1.060.000	-20.000	20.000	2%
(4)	800.000	1.000.000	-200.000	800.000	1.060.000	-260.000	-460.000	-46%
(5)	0	1.000.000	-1.000.000	0	1.060.000	-1.060.000	-2.060.000	-206%

Task 6 Results

Wealth after repayment of the loan and payment of interest

case	Revenue	Costs (payoff loan and interest)	Wealth
(1)	3.000.000	1.060.000	1.940.000
(2)	2.230.000	1.060.000	1.170.000
(3)	2.080.000	1.060.000	1.020.000
(4)	1.600.000	1.060.000	540.000
(5)	0	1.060.000	-1.060.000

Task 7 Business plan evaluation

- Sale price of the goods 1500 CZK/pc
- Planned production 200 pc
- Average variable cost
- Material 520 CZK/pc
- Other direct costs 680 CZK/pc
- Fixed costs 50000 CZK/year
- Depreciation is 80% of fixed costs, each year 10% od total assest depreciated
- Is the plan profitable?
- Is the plan profitable enough, when bank offers interest rate at 5%?

Task 8 Balance sheet analysis - profitability

Assets BS (32.12.2018) Liabilities

Investment	6 000	Equity	24 000
Current assets	37 600	Liabilities	16 000
Profit		3 600	
43 600		43 600	

Costs Profit/loss statement Revenues

Good purchase	6 000	Sales	20 000
Salaries	9 440		
Interest	960		
Profit	3 600		
	20 000		20 000

Calculate ROA…
Calculate ROE…

Task 8 Solution

Assets BS (32.12.2018) Liabilities

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Task 8 Solution

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