INVESTMENT SELECTION PROBLEMS

1.- One person, Mr. Smith, is able to invest his available liquid capital to 5 percent rate per year. Currently, another person, Mr. Martinez, must pay Mr. Smith the amount of $ 1,000, but he's going thru a period of scarce liquidity and asks him to withhold. How much money will Mr. Smith require if it is delayed a year? What if it's a two year delay? What if it were three years of deferment?

Solution

i=5%

C_o = Debt = 1.000€

This is a capitalization exercise, so that they calculate the future equivalent of quantities available hereunder. The general rule is

$$Cn = C_o (1+i)^n$$

So, for every case we have

$C_1 = C_o (1+i) = 1000 (1+0.05) = 1.050$

$C_2 = C_o (1+i)^2 = 1000 (1+0.05)^2 = 1.102,5$

$C_3 = C_o (1+i)^3 = 1000 (1+0.05)^3 = 1.157,62$

2.- In the year 0, the company Alfa S.A., has the following financial structure:

Capital.....6.000.000

Reserves.....4.800.000

Debt.....7.200.000

Total.....18.000.000

If this company can retain benefits of 1,200,000 Euros at end of year 1, what is its ability to obtain new debt in year 1 (how much more you can borrow in year 1 compared to 0) without changing its financial structure?

Solution

You should be able to identify the current financial structure

Equity(0)= Capital(0)+Retained Earnings(0)=6.000.000+4.800.000=10.800.000

Debt(0)=7.200.000

Therefore, we know that

%Equity(0)=10.800.0000/18.000.000=0.6; **60%**

%Debt(0) = 0.4; **40%**

If the company is now able to generate profits and retain them of 1,200,000 €, it means that VEPs will be increased from the previous year by that amount.

Thus,

Equity(1)= 10.800.000+1.200.000=**12.000.000**

As the financial structure must be the same

%Equity(1)=0.6=12.000.000/Total Liabilities and Equity**;** **TL&E(1) = 20.000.000**

%Debt(1)=0.4=D(1)/TL&E(1)**;** 0.4 = D(i)/20.000.000; **D (1)= 8.000.000**

As what you're asking us is how much the new debt is worth,

D(1)= D(0) + new debt = 7.200.000 + new debt

New Debt = 8.000.000-7.200.000 **= 800.000**

3.- Límite S.A. has 1,200 millions to invest in this period. Applying the criterion of recovery or payback, indicate which investment project is preferred and why.

Project	Initial outlay	Cash Flows					
		Q_1	Q_2	Q_3	Q_4	Q_5	Q_6
X	1.200	-200	300	500	200	400	400
Y	1.200	200	200	200	200	200	200
Z	1.000	125	125	250	250	250	250

Solution

Payback (X)= 5 years

Payback (Y)= 6 years

Payback (Z)= 5 years and 10 months

X will be preferable even if it generates negative cash flow in the first year. If this has no additional cost, X will be preferable

4.- What is the maximum amount we should invest in a project at time 0 if the estimated annual cash inflow is €30,000 over a period of 4 years starting from year 1? Assume that the estimated internal rate of return is 8%.

Solution

Knowing that the IRR is the rate (I-K) that causes the NPV to equal 0. We clear

$$VAN = -I_0 + \frac{30.000}{1{,}08} + \frac{30.000}{1{,}08^2} + \frac{30.000}{1{,}08^3} + \frac{30.000}{1{,}08^4} = 0 \Rightarrow I_0 = 99.363{,}81$$

$I_0 = 99.363{,}81$ is the maximum amount of investment

5.- Consider these projects and provide answers for the following questions:

	CASH FLOW IN EUROS					
PROJECTS	**C_0**	**C_1**	**C_2**	**C_3**	**C_4**	**C_5**
A	-1.000	+1.000	0	0	0	0
B	-2.000	+1.000	+1.000	+4.000	+1.000	+1.000
C	-3.000	+1.000	+1.000	0	+1.000	+1.000

a) If the interest rate is 10%, which projects have a positive NPV?
b) Calculate the payback period for each project.
c) Which project(s) would be accepted by a company that uses the payback period model if the maximum period is three years?

Solution

a) $$VAN(A) = -1.000 + \frac{1.000}{1{,}1} = -90{,}91$$

$$VAN(B) = -2.000 + \frac{1.000}{1{,}1} + \frac{1.000}{1{,}1^2} + \frac{4.000}{1{,}1^3} + \frac{1.000}{1{,}1^4} + \frac{1.000}{1{,}1^5} = 4044{,}7$$

$$VAN(C) = -3.000 + \frac{1.000}{1{,}1} + \frac{1.000}{1{,}1^2} + \frac{1.000}{1{,}1^4} + \frac{1.000}{1{,}1^5} = 39{,}47$$

Projects with positive VAN are B and C.

b) The payback period for each project will be the time it takes to recover the initial investment:

- Proyect A: 1 year
- Proyect B: 2 years
- Proyect C: 4 years

c) A company that uses the Payback criterion, and imposes a maximum period of three years, would accept projects A and B. Subsequently, through the NPV criterion, between these two projects it will opt for B.

6.- Assuming an interest rate of 7%, consider a three-year investment period generating a positive cash flow of €10,000 per year with an internal rate of return of 10%. Calculate the NPV of this investment.

Solution

i = 0.07

a) IRR = 0.1
Period = 3 años

CF1 = CF2 = CF3 = 10.000 €

$$VAN = -I_0 + \frac{10.000}{1{,}07} + \frac{10.000}{1{,}07^2} + \frac{10.000}{1{,}07^3}$$

Io is missing but the IRR is known to be 10%, therefore

$$-I_0 + \frac{10.000}{1{,}1} + \frac{10.000}{1{,}1^2} + \frac{10.000}{1{,}1^3} = 0$$ clearing I_o = 24.868 €

Thus, $VAN = -24.868 + \frac{10.000}{1{,}07} + \frac{10.000}{1{,}07^2} + \frac{10.000}{1{,}07^3} = 1.375$ €

b) Since K=9% is greater than 7% it can be said that the NPV is less than the previous one. But at the same time, being less than the 10% that is the IRR, it can be said that the NPV is positive (IRR>K).

7.- You want to rank, in order of preference, according to the criterion of NPV, the investment projects with initial payments and cash flows generated in the different years of its duration, listed in the table below:

PROJECTS	Net Cash Flows (euros)					Initial outlay (euros)
	First Years	Second Year	Third year	Fourth year	Fifth year	
A	2.000	2.000	3.500	3.500	3.500	10.000
B	2.000	2.000	4.000	4.000	4.000	11.000
C	3.000	3.000	4.000	4.000	4.000	12.000
D	2.000	2.000	15.000	------	------	13.000
E	2.000	3.000	5.000	5.000	5.000	14.000
F	4.000	4.000	4.500	4.500	4.500	15.000

The required profitability is the same for all projects (10 percent). Which projects should be undertaken by an individual who has 40,000 Euros to invest if they can not be repeated (neither can be done several times)?

Solution

Since it has a budget of 40,000 euros, it will be used in the largest NPV.

	NPV
A	664,45 (5º)
B	692,07 (4º)
C	1.427,61 (2º)
D	1.740,8 (1º)
E	573,77 (6º)
F	1.190,77 (3º)

Everyone has positive NPV, but we only select 3 (D=13.000, C=12.000 and F=15.000) given our budget limit (40.000€).

8.- The director of the financial department for the GOFRES, S.A. Company raises the possibility of investing in a project with a profitability of 8.5%. GOFRES, SA is funded on a 30% equity capital; the cost is estimated to be 15%, and the rest with foreign funds, with an average cost of 8%. What would be your advice to this executive: to carry out the project or to not invest and why? How does your answer change if you were offered another investment project with a yield of 18.5%?

Solution

IRR = 8.5%

%Equity = 30%
K Equity = 0.15
%Debt = 70%
KDebt=0.08

K = 0.3*0.15+0.7*0.08
K= 0.101 ---**10.1%**

If IRR= 8.5%, As IRR<k.... We reject investment project

If IRR = 18.5%, As IRR>k, We accept investment project

9.- Company OSOPANDA, S.L. is considering an investment, for which it has two offers. The first offer's (Project A) initial payment amounts to €16,653 and generates cash-flows of €6,500 and €13,000 during the first and second years (two-year period), respectively. The second offer (Project B) means a much higher initial payment, amounting to €71,428. It will end in a year, and it is expected to generate positive cash-flow of €76,428 by the end of that year. As per the information given, answer the following questions and account for your answers:

a) Which project would the company choose if it uses the payback period model?
b) Analyze both alternatives in terms of internal rate of return (IRR).

Solution

Proyect A:
A = 16.653 €
CF1 = 6.500 €
CF2 = 13.000 €
Proyecto B:
A = 71.428 €
CF1 = 76.428 €

a) Payback period

Proyect A: 1 year, 9 months and days (12, if we consider the month of 30 days).
Proyect B: 11 months y 7 days (if we consider the month of 30 days)
According to the criterion of the recovery period, project B is preferred.

b) Study of the interest of each project based on the opportunity cost of capital:

$$VAN_A = -16.653 + \frac{6500}{1+i} + \frac{13000}{(1+i)^2}$$

$$VAN_B = -71.428 + \frac{76428}{1+i}$$

- The IRR of each of the two projects is calculated:
  Proyect A….. IRR (A) = 0.0999; around 10%
  Proyect B…. IRR (B) = 0.07; around 7%
- We calculate the Fisher rate: NPV (A) = NPV (B).
  We can get: i = 0.0507; around 5%
- It is priced with a value less than 5% and a higher one, to verify that in lower values NPV (B) > NPV (A); and for higher values it's the opposite. It can also be seen with an approximate graphical representation and without the need to do more calculations.

Solution:
- For i values < 5%, option B is chosen.
- For values greater than 5% and up to 10%, option A is chosen
- For values greater than 10% neither project is feasible.