

Problems on Capital Budgeting

Problem 1

Gondor's government wants to privatize Acqua Corp. which is the company that provides and distributes water in Gondor's Realm. The annual revenue from the sales of water is 5.000 Gondor's Guilders (GG henceforth). Annual maintenance cost of the water network is 2.000 GG and other overhead annual costs are 1.000 GG. The corporate tax rate is 20%. All annual cashflows will remain constant and will be paid (or received) at the end of every year. Acqua Corp. will be in business **forever**. The discount rate is 10% per year.

- a) Gondor's government offers Sauron to buy Acqua in exchange for 10 annual payments of 4000 GG during the next ten years. Payments are due at the end of every year. Shall Sauron accept Gondor's offer?
- b) Suppose now that Sauron can buy Acqua Corp for an immediate payment of just 6000 GG but in this case at the end of every year he will receive only 50% of Acqua Corp.'s annual net income.
 - b1) Shall Sauron buy Acqua Corp in this case?
 - b2) What is the internal rate of return of this investment?

Problem 2

AirNac is an airlines company in financial distress. You can avoid AirNac's imminent bankruptcy and become its exclusive owner by providing "fresh capital" for 100M €

AirNac's aircraft fleet is composed of 25 "SuperAntonof" that are 18 years old. The annual maintenance cost for **one** SuperAntonof is 4M €, whereas AirNac's annual overhead costs are equal to 10M €. The annual sales revenue of AirNac is estimated at 100M €. All annual cashflows will remain constant and will be paid (or received) at the end of every year. Thanks to a special agreement with the government, AirNac pays no corporate taxes, but in 30 years time AirNac will be nationalized and no indemnity will be paid to the owners of the company for the expropriation. For all computations, you should use an annual discount rate of 5%.

- a) Would you rescue AirNac from bankruptcy in these conditions? Why?
- b) Suppose now that it is possible to renew the AirNac's fleet with 25 new aircraft Airbus XX2000. The annual maintenance cost of **one** XX2000 is 1M €. Moreover, if you purchase the XX2000, you will be able to sell the old 25 SuperAntonof crafts at 0.8M € each. Assume that you will have to pay the purchasing cost of the XX2000 and will be able to receive the proceeds from the sale of the SuperAntonof at $t=0$. Finally, assume that annual sales revenues and overhead costs would be left unchanged by the purchase of the XX2000.
What is the price for a XX2000 aircraft below which it would be profitable to rescue AirNac **and** renew its fleet?
- c) Suppose now that the price of a XX2000 aircraft is **exactly equal to** the threshold price you computed in question b).
What is the **IRR (Internal Rate of Return)** of rescuing AirNac ? (i.e. of the investment project whereby you inject fresh capital of 100M €, sell the SuperAntonof, purchase the XX2000 and operate AirNac for 30 years)

Solution:

Problem 1

$$\begin{aligned} \text{a. Annual CF of Acqua Corp.} &= (\text{Revenue} - \text{Maintenance Costs} - \text{Overhead Costs}) \times (1 - t) \\ &= (5.000 - 2.000 - 1.000) \times (1 - 0,20) = 1.600 \text{ GG} \end{aligned}$$

$$\text{NPV for Sauron} = -\frac{4.000}{0,10} \left(1 - \frac{1}{(1+0,10)^{10}} \right) + \frac{1.600}{0,10} = -24.578,27 + 16.000 = -8.578,27 \text{ GG}$$

Sauron should not buy Acqua corp.

$$\text{b1. NPV for Sauron} = -6.000 + \frac{800}{0,10} = -6.000 + 8.000 = +2.000 \text{ GG} . \text{ He should buy Acqua.}$$

$$\text{b2. } NPV = -6.000 + \frac{800}{IRR} = 0 \Rightarrow IRR = \frac{800}{6.000} = 0,1333 = 13,33\%$$

Problem 2

a. No, because annual revenues of 100 million only cover the maintenance costs of AirNac's ageing fleet and do not cover its overhead costs. If you inject 100 million in capital, you will only receive negative CFs, which is a negative NPV project:

$$\begin{aligned} CF_i &= (\text{Revenues} - \text{Operating Costs}) \times (1 - t) \quad \text{for } i=1, \dots, 30, \text{ and in millions } \text{€} \\ CF_i &= (100 - 25 \times 4 - 10) \times (1 - 0) = -10 \text{ million } \text{€} \end{aligned}$$

$$\begin{aligned} \text{b. Now, } CF_i &= (\text{Revenues} - \text{Operating Costs}) \times (1 - t) \\ CF_i &= (100 - 25 \times 1 - 10) \times (1 - 0) = +65 \text{ million } \text{€ per year} \end{aligned}$$

$$NPV_0 = -I_0 + \sum_{i=1}^{30} CF_i = -100 - 25 \times I_0^{Airbus} + 25 \times 0,8 + \frac{65}{0,05} \left(1 - \frac{1}{(1+0,05)^{30}} \right) > 0$$

$$-100 - 25 \times I_0^{Airbus} + 20 + 999,21 > 0$$

$$I_0^{Airbus} < \frac{-100 + 20 + 999,21}{25} = 36,77 \text{ million euros per XX 2000 Airbus}$$

c. If $I_0^{Airbus} = 36,77 \text{ million euros per XX 2000 Airbus}$, then NPV of rescuing AirNac is equal to zero at an interest rate of 5%, thus $IRR=5\%$.