Exercise 03

Company XYZ has four debts to settle in the amounts of 5,000, 10,000, 15,000, and 20,000 Euros, with maturities in 1, 2, 3, and 4 years, respectively. It was negotiated with the creditor to replace the 4 previous debts with 2 debts of equal amount, maturing in 2.0 years and 2.5 years.

We intend to calculate the value of these new debts, considering an annual discount rate of 10% and a 30/360 calendar basis.

Solution

O formulário dá-nos a seguinte Equação de Valor para o desconto por fora em regime de juros simples:

$$\underbrace{\sum_{s=1}^{k}(M_s - i_s M_s n_s)}_{\text{VA}_0} = \underbrace{\sum_{s=1}^{p}\left(M_s^{'} - i_s^{'} M_s^{'} n_s^{'}\right)}_{\text{VA}'}$$

or, alternatively,

$$\underbrace{\sum_{s=1}^{k} M_s(1 - i_s n_s)}_{\text{VA}_0} = \underbrace{\sum_{s=1}^{p} M_s^{'}(1 - i_s^{'} n_s^{'})}_{\text{VA}'}$$

Present value of contracted debts:

VA_0 = (5000 + 10000 + 15000 + 20000) – 10% x (5000 x 1 + 10000 x 2 + 15000 x 3 + 20000 x 4)

VA_0 = 35000

Lets denote by $M'_{2.0}$ and $M'_{2.5}$ the amount of new debt with maturity in 2.0 and 2.5 years, respectively. Therefore we have,

$M'_{2.0} = M'_{2.5} = M'$

Present value of new debts will be,

VA' = 2 x M' – 10% x (M' x 2.0 + M' x 2.5) = 2 x M' – 0.45 x M' = 1.55 M'

Therefore, by equating the present value of the contracted debts with the present value of the proposed new debts, we have,

$VA_0 = VA'$

35000 = 1.55 x M'

M' = 35000/1.55 = 22580.6452

Company XYZ has four debts to settle in the amounts of 5,000, 10,000, 15,000, and 20,000 Euros, with maturities in 1, 2, 3, and 4 years, respectively. It was negotiated with the creditor to replace the 4 previous debts with 2 debts of equal amount, maturing in 2.0 years and 2.5 years.

We intend to calculate the value of these new debts, considering (i) that the initially contracted annual discount rate was 10%, but (ii) that now for the new substitute debts, a penalty discount rate of 15% applies, and (iii) that the calendar basis is 30/360.

Solution

Present value of contracted debts:

$$VA_0 = (5000 + 10000 + 15000 + 20000) - 10\% \times (5000 \times 1 + 10000 \times 2 + 15000 \times 3 + 20000 \times 4)$$

$$VA_0 = 35000$$

Present value of new debts will now be,

$$VA' = 2 \times M' - \underline{15\%} \times (M' \times 2.0 + M' \times 2.5) = 2 \times M' - 0.675 \times M' = 1.325\ M'$$

Therefore, by equating the present value of the contracted debts with the present value of the proposed new debts, we have,

$$VA_0 = VA'$$

$$35000 = 1.325 \times M'$$

$$M' = 35000/1.325 = 26415.09434$$

Now, with the penalty on the discount rate, the entity that requested the renegotiation of the debts will have to pay the amount of EUR 26,415.09 at the maturity of those debts, instead of the amount of EUR 22,580.65, which it would have paid if the discount rate had remained the same as the originally contracted 10%, instead of the renegotiated 15%.