Useful Formulas

Present value:

$$PV = \frac{C_t}{(1+r)^t}$$

Present values when there are multiple cash flows:

$$PV = \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \frac{C_3}{(1+r)^3} + \ldots + \frac{C_T}{(1+r)^T} = \sum_{t=1}^{T} \frac{C_t}{(1+r)^t}$$

Net Present Value (NPV):

$$NPV = -C_0 + PV = -C_0 + \sum_{t=1}^{T} \frac{C_t}{(1+r)^t}$$

Present value of perpetuity:

$$PV = \frac{C}{r}$$

Present value of growing perpetuity:

$$PV = \frac{C_1}{r-g}$$ We assume that r is greater than g.

Present value of an annuity that pays €1 at the end of each of the t years starting in year 1 (Annuity Factor):

$$PV = \sum_{t=1}^{T} \frac{1}{(1+r)^t} = \frac{1 - \frac{1}{(1+r)^t}}{r} = \frac{1}{r} - \frac{1}{r(1+r)^t}$$

Present value of an annuity that pays €1 at the start of each of the t years starting in year 1 (Annuity Due):

$$PV = \left[\sum_{t=1}^{T} \frac{1}{(1+r)^t} \right] (1+r) = \left[\frac{1 - \frac{1}{(1+r)^t}}{r} \right] (1+r) = \left[\frac{1}{r} - \frac{1}{r(1+r)^t} \right] (1+r)$$

Calculating Annual Payments:

$$\text{Annual Payment} = \frac{PV}{\text{Annuity Factor}}$$

Merger Gains and Costs:

$$\text{Gain} = \text{PV}_{\text{AB}} - (\text{PV}_{\text{A}} + \text{PV}_{\text{B}})$$

$$\text{Cost}_{\text{A}} = \text{Cash paid} - \text{PV}_{\text{B}}$$

$$\text{Cost}_{\text{A}} = \text{NP}_{\text{AB}} - \text{PV}_{\text{B}} \qquad \text{Cost}_{\text{A}} = \text{xPV}_{\text{AB}} - \text{PV}_{\text{B}}$$

$$\text{NPV}_{\text{A}} = \text{Gain} - \text{Cost}$$

Net Advantage to Leasing (NAL):

NAL = PV Cost of Leasing – PV Cost of Owning