Calculation Example: Levered Investment Property

Question: Value an investment property with:

- $50,000 gross rent revenue this year, expected to be paid at the end of the year (in arrears);
- $10,000 maintenance costs also paid annually in arrears;
- The building is fully depreciated for tax purposes and there is no capital expenditure required in the foreseeable future;
- 3% pa perpetual growth rate in rent revenue and costs.
- 5% pa mortgage rate;
- 80% loan-to-valuation ratio (LVR or debt-to-assets ratio);
- 9.8% pa required total return on property (WACC **before** tax);
- 30% tax rate.

Answer using textbook method: With the data given, it will be easier to find the OFCF compared to the FFCF, but the WACC after tax will be a little harder to calculate.

First find the net operating profit after tax (NOPAT) in the first year. Use ‘k’ for thousands (kilo).

$$NOPAT_1 = (Rev_1 - COGS_1 - FC_1 - Depr_1 - \mathbf{0}).(1 - t_c)$$

$$= (50k - 0 - 10k - 0 - 0).(1 - 0.3) = 28k$$

Then find the operating free cash flow (OFCF) in the first year:

$$OFCF_1 = NOPAT_1 + Depr_1 - CapEx_1 \; - \; \Delta NOWC_1 + \mathbf{0}$$

$$= 28k + 0 - 0 \; - \; 0 + 0 = 28k$$

To find the WACC after tax, we first need to find the cost of equity (r_E) based on the WACC before tax provided:

$$WACC_{before-tax} = r_D . \frac{D}{V_L} + r_E . \frac{E}{V_L}$$

$$0.098 = 0.05 \times 0.8 + r_E \times (1 - 0.8)$$

$$r_E = \frac{0.098 - 0.05 \times 0.8}{1 - 0.8} = 0.29$$

Now find the WACC after tax based on the cost of equity:

$$WACC_{after-tax} = r_D . (1 - t_c) . \frac{D}{V_L} + r_E . \frac{E}{V_L}$$

$$= 0.05 \times (1 - 0.3) \times 0.8 + 0.29 \times (1 - 0.8)$$

$$= 0.086$$

$$V_L = PV[OFCF, discounted\ by\ WACC_{after-tax}]$$

$$V_{L0} = \frac{OFCF_1}{WACC_{after\ tax} - g}$$

$$= \frac{28000}{0.086 - 0.03}$$

$$= 500{,}000$$

Answer using 'harder' method: With the data given, it will be harder to find the FFCF but the WACC before tax is already known!

First find the net income (NI, also called earnings or profit) in the first year, remembering that:

$$\boldsymbol{IntExp_1 = D_0 . r_D = D_0 \times 0.05}$$

Where $\boldsymbol{D_0}$ is the debt value now and $\boldsymbol{r_D}$ is the expected yield to maturity. Use 'k' for thousands (kilo).

$$\begin{aligned} NI_1 &= (Rev_1 - COGS_1 - FC_1 - Depr_1 - \boldsymbol{IntExp_1}).(1 - t_c) \\ &= (50k - 0 - 10k - 0 - \boldsymbol{D_0 \times 0.05}).(1 - 0.3) \\ &= (40k - \boldsymbol{D_0 \times 0.05}).(1 - 0.3) \end{aligned}$$

Then find the firm free cash flow (FFCF) in the first year:

$$FFCF_1 = NI_1 + Depr_1 - CapEx_1 - \Delta NOWC_1 + \boldsymbol{IntExp_1}$$

$$= (40k - \boldsymbol{D_0 \times 0.05}).(1 - 0.3) + 0 - 0 - 0 + \boldsymbol{D_0 \times 0.05}$$

$$= (40k - \boldsymbol{D_0 \times 0.05}) \times 0.7 + \boldsymbol{D_0 \times 0.05}$$

$$= 28k - \boldsymbol{D_0 \times 0.05} \times 0.7 + \boldsymbol{D_0 \times 0.05}$$

$$= 28k + \boldsymbol{D_0 \times 0.05} \times 0.3$$

$$= 28k + D_0 \times 0.015$$

This formula is familiar since the FFCF is just OFCF plus the interest tax shield per annum ($IntExp_1.t_c = D_0.r_{D\ 0\to 1}.t_c$):

$$FFCF = OFCF + IntExp.t_c$$

$$= OFCF + D.r_D.t_c$$

$$= 28k + D_0 \times 0.05 \times 0.3$$

Now we can find the value of the levered investment property:

$$V_L = PV[FFCF, discounted\ by\ WACC_{before-tax}]$$

$$V_{L0} = \frac{FFCF_1}{WACC_{before\ tax} - g}$$

$$= \frac{28k + D_0 \times 0.015}{0.098 - 0.03}$$

Re-arranging the debt-to-assets ratio, $\frac{D}{V_L} = 0.8$, we know that the debt $D_0 = V_{L0} \times 0.8$, so:

$$V_{L0} = \frac{28k + V_{L0} \times 0.8 \times 0.015}{0.098 - 0.03}$$

$$V_{L0} = \frac{28k + 0.012 \times V_{L0}}{0.068}$$

$$0.068 \times V_{L0} = 28k + 0.012 \times V_{L0}$$

$$0.068 \times V_{L0} - 0.012 \times V_{L0} = 28k$$

$$0.056 \times V_{L0} = 28k$$

$$V_{L0} = \frac{28k}{0.056}$$

$$= 500{,}000$$

Same as the textbook method!