About the perpetuity growth rate in a DCF approach

Olivier Levyne (2019)

1. Refresher on the terminal value

Notations:

$EV =$ Enterprise Value as calculated now

$TV =$ Terminal Value

$n =$ number of years in the business plan

$g =$ perpetuity growth rate of the last *FCF*

$$EV = \sum_{t=1}^{+\infty} \frac{FCF_t}{(1+K)^t} = \sum_{t=1}^{n} \frac{FCF_t}{(1+K)^t} + \sum_{t=n+1}^{+\infty} \frac{FCF_t}{(1+K)^t}$$

$$TV = \sum_{t=n+1}^{+\infty} \frac{FCF_t}{(1+K)^t} = \frac{FCF_{n+1}}{(1+K)^{n+1}} + \frac{FCF_{n+2}}{(1+K)^{n+2}} + \cdots$$

$$TV = \frac{(1+g).FCF_n}{(K-g).(1+K)^n}$$

2. Terminal value and enterprise value as calculated at the end of the business plan

$$TV = \sum_{t=n+1}^{+\infty} \frac{FCF_t}{(1+K)^t} = \frac{1}{(1+K)^n}\left[\frac{FCF_{n+1}}{(1+K)^1} + \frac{FCF_{n+2}}{(1+K)^2} + \cdots\right]$$

$$TV = \sum_{t=n+1}^{+\infty} \frac{FCF_t}{(1+K)^t} = \frac{1}{(1+K)^n} \sum_{t=1}^{+\infty} \frac{FCF_{n+t}}{(1+K)^t}$$

Notation:

$EV' =$ Enterprise Value as calculated at end of the business plan (ie as at 31/12/*n*)

$$TV = \sum_{t=n+1}^{+\infty} \frac{FCF_t}{(1+K)^t} = \frac{1}{(1+K)^n} EV'$$

Then:

$$EV' = TV.(1+K)^n = \frac{(1+g).FCF_n}{(K-g).(1+K)^n}.(1+K)^n = \frac{(1+g).FCF_n}{(K-g)}$$

$$(1+g).FCF_n = EV'(K-g) \Leftrightarrow g.FCF_n + g.EV' = K.EV' - FCF_n$$

$$g = \frac{K.EV' - FCF_n}{EV' + FCF_n}$$

EV' can also be calculated based on an EBITDA or EBIT multiple. And, assuming an unchanged market status over time, the EBTDA or EBIT multiple of the business plan's n^{th} year, as calculated during this last year, is that of the current year. Then, for the performance of a valuation in 2019:

$$EV' = \frac{EV_{2019}}{EBITDA_{2019}}.EBITDA_n$$

If the firm to be valued is listed, $EV_{2019} = Market\ cap + \ Net\ debt_{2019}$

If the firm is not listed, $\frac{EV_{2019}}{EBITDA_{2019}}$ is based on a sample of listed peers.

3. Example

Market cap				12 877
Net debt 2019				-1 245
EV 2019				11 632
EV/EBITDA 2019				7,114
EBITDA 2025				1 999
EV' = EV calculated in 2025 and based on EBITDA 2015				14 220

Assuming a 7.47% WACC and a 1.106 last FCF (in 2025)

$$g = \frac{K.EV' - FCF_n}{EV' + FCF_n} = \frac{7.47\%.14.120 - 1.106}{14.120 + 1.106} = -0.3\%$$