***Enterprise Value Definition***

Enterprise value (EV) is the business' total assets (V) less cash and cash equivalents which includes marketable securities. Note that marketable securities does not include minority interests. Marketable securities is only supposed to include shares in companies whose value can simply be looked up on the stock exchange.

$$EV=V-(cash and cash equivalents)$$

Because the firm's total assets also equals total equity (E) plus debt (D), enterprise value also equals:

$$EV=D+E-\left(cash and cash equivalents\right)$$

$$ =NetDebt+E$$

***Enterprise Value Advantages***

The advantages of focusing on enterprise value (EV) rather than the value of all of the firm's assets (V) are:

1. The value of cash and marketable securities is already known and doesn't need to be calculated. These can simply be added to enterprise value to find the value of the whole firm.

2. The systematic risk (beta) and therefore the cost of capital of the firm's 'enterprise' or 'operating' assets is likely to be more stable than total assets which includes cash. This is because cash can fluctuate significantly and with its beta of zero, will tend to reduce the overall beta of assets.

***Enterprise Value, FFCF and NOWC***

The enterprise value (EV) of a project or a company whose shares are unlisted can be calculated using the ***enterprise*** firm free cash flow $FFCF\_{enterprise}$. Note that practitioners and textbooks often ignore the enterprise prefix, they will often assume that FFCF or CFFA is always the free cash flow from enterprise assets.

Enterprise FFCF is just like the FFCF from all of the firm's assets including cash and cash equivalents, but the change in net working capital ($ΔNWC$) is replaced with the change in net ***operating*** working capital ($ΔNOWC$), which is the change in current operating assets (COA) less current operating liabilities (COL).

$$ΔNOWC=NOWC\_{now}-NOWC\_{before}$$

$$ =COA\_{now}-COL\_{now}-(COA\_{before}-COL\_{before})$$

Also, net income (NI) should technically exclude revenues from the cash and cash equivalents, let's call this $NI\_{ent}$. In practice the difference can be negligible and is ignored.

$$FFCF\_{ent}=NI\_{ent}+Depr-CapEx-ΔNOWC+IntExp$$

Enterprise value equals the enterprise firm free cash flow discounted by the required return on enterprise assets ($r\_{EV}$):

$$EV=PV\left(FFCF\_{enterprise} discounted by r\_{EV}\right)$$

The usual convention of including but not double-counting the interest-tax shields also applies.

The required return on enterprise assets ($r\_{EV}$) can be found using the WACC or the CAPM.

***Enterprise Value and CAPM***

$$r\_{EV before tax}=r\_{f}+β\_{EV}\left(r\_{m}-r\_{f}\right)$$

$$r\_{EV after tax}=r\_{f}+β\_{EV}\left(r\_{m}-r\_{f}\right)-\frac{NetDebt}{EV}.r\_{NetDebt}.t\_{c}$$

The enterprise value beta can be found directly using the usual method:

$$β\_{EV}=\frac{cov\left(r\_{EV},r\_{m}\right)}{var\left(r\_{m}\right)}=\frac{σ\_{EV,m}}{σ\_{m}^{2}}$$

Or if the firm's or a similar firm's equity is listed, it can be found indirectly using the "portfolio beta" equation:

$$β\_{EV}=\frac{E}{EV}.β\_{E}+\frac{NetDebt}{EV}.β\_{NetDebt}$$

$$β\_{EV}=\frac{E}{EV}.β\_{E}+\frac{D}{EV}.β\_{D}-\frac{cash}{EV}.β\_{cash}$$

The relationship between the enterprise beta and all-asset beta can be seen in the portfolio beta equation.

$$β\_{V}=\frac{EV}{V}.β\_{EV}+\frac{cash}{V}.β\_{cash}$$

Since the beta of cash is often assumed to be zero, $β\_{cash}=0$:

$$β\_{V}=\frac{EV}{V}.β\_{EV}$$

***Enterprise Value and WACC***

$$r\_{EV before tax}=WACC\_{before tax}=r\_{E}.\frac{E}{EV}+r\_{NetDebt}.\frac{NetDebt}{EV}$$

$$r\_{EV after tax}=WACC\_{after tax}=r\_{E}.\frac{E}{EV}+r\_{NetDebt}.\left(1-t\_{c}\right).\frac{NetDebt}{EV}$$