TERMINAL VALUES IN CORPORATE VALUATION

1) Introduction

• In DCF-based corporate valuation exercises, terminal values—i.e., the value associated with cash flows arising in future time periods following the time periods used in the proforma projections—can often account for a sizeable portion of the total estimated value of the firm.

• In many real-world valuation exercises, it is not at all unusual for 50% to 75% of the firm value to be embedded in its terminal value. Indeed, I have seen valuations (for subsequently ‘successful’ acquisitions) where more than 100% of the target firm’s value was embedded in its terminal value.

• The good news is that the standard methods that are used to calculate terminal values are simple to understand and easy to apply. The bad news is that their ease and simplicity make them a ‘reduced form’ approach to valuation that often masks many crucial underlying assumptions. This is somewhat bothersome, considering how high a proportion of total firm value is typically associated with the terminal value.¹

2) The Commonly Used Methods

• There are two commonly used methods to calculate terminal values: the multiples valuation method, and the cash flow growth valuation method. Although they look different from each other, they are both conceptually similar methods: Both are shorthand ways of calculating the present values associated with discounting a set of expected future cash flows.

• The Multiples Valuation Method:

The approach here is to take the terminal year free cash flows² (or a metric that is highly correlated with it) and multiply it by an appropriate share price multiple.

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1 Indeed, for all the considerable debate that goes on amongst scholars in finance about matters such the use of the right DCF methodology (WACC, APV or FTE), whether traditional CAPM betas are any good or not (and if not, whether we should undertake ‘size’ and ‘market-to-book’ corrections), what the ‘correct’ market risk premium should be, and so forth, little attention is paid to the issue of terminal value calculations that account for a sizeable portion of the value in M&A valuations!

2 Free cash flow is defined as EBIT*(1 – Tax Rate) plus Depreciation minus Change in Net Working Capital minus Capital Expenditure. It is derived as though the firm has no debt in its capital structure (i.e., as though it is ‘unlevered’). Note that, if: (1) Depreciation equals Capital Expenditure, and (2) the Change in Current Assets is equal to the Change in Current Liabilities (i.e., Change in Net Working Capital is zero), and (3) the firm has little or no debt in its capital structure, then Free Cash Flow = EBIT*(1 – Tax Rate) = Net Income (or Earnings).
The three most common multiples used are the price-to-cash flow multiple (P/CF), the price-to-earnings multiple (P/E), and the price-to-EBIT multiple (P/EBIT). The appropriate free cash flows (or net income or EBIT) are projected for the last proforma year are multiplied by the respective P/CF (or P/E or P/EBIT) ratio. This value is then discounted back to the present using the appropriate discount factor.

For example, suppose the proforma valuation goes out seven years, the target firm’s WACC is 10%, and the seventh-year free cash flow is $100. Further, assume that the appropriate P/CF multiple for firms in this type of business is 21. The estimated terminal value is:

\[ \text{Terminal Value} = 100 \times 21 = 2100 \]

The present value (i.e., value today) of this terminal value is:

\[ \text{PV (Terminal Value)} = \frac{2100}{1.1^7} = 1077.63 \]

What is the appropriate multiple to use? There are no easy answers, but many valuations typically use industry averages or averages of analyst estimates.

• The Cash Flow Growth Valuation Method:

The most common approach here is to take the terminal year cash flows (calculated as shown above), and apply the constant growth valuation model using the weighted average cost of capital as the appropriate cost of capital. If we call the terminal year cash flows \( CF_T \), the cost of capital WACC, and the long run expected annual growth rate in cash flows ‘\( g \)’, then the terminal value is given by the formula:

\[ \text{Terminal Value} = \frac{CF_T}{WACC - g} \]

Using the example above, \( CF_T = 105 \), \( WACC = 10\% \), and if \( g = 5\% \), then:

\[ \text{Terminal Value} = \frac{105}{0.10 - 0.05} = 2100 \]

Increasingly, however, the following multiples are also used: Price/EBITDA (EBITDA = earnings before interest, depreciation and amortization), Price/Sales, and Price/Employee. The reason for the increased popularity of these metrics has to do with the fact that, in many high-growth industries with a great deal of investment activity (e.g., software, internet, biotechnology, etc), free cash flows, EBIT, and earnings are often negative. Thus, the traditional multiples make little sense. Moreover, such industries also tend to be human-capital intensive, and therefore, acquiring firms like to get a sense of how much they are paying per employee acquired. The CEO of an Cisco Systems, John Chambers, who has grown his company through over 50 acquisitions in the 1990s, for instance, used to say that paying less than half-a-million dollars per employee is too little, and paying more than one-and-a-half million is too much. (However, that was before he paid $7 billion for a company called Cerent in 1999, a company with 250 employees—approximately $28 million per employee). The price-to-sales ratio is the same thing as (P/E) multiplied the firm’s return on sales (ROS; Net Income divided by Sales), and the price-to-employee ratio is the same thing as (P/E) multiplied by the Net Income-per-employee.

This formula results from the algebraic simplification of an infinite series starting as \( CF_T \), growing at rate \( g \) annually, and discounted at WACC, with the condition that \( g < WACC \) (Of course, this condition will always be met in the real world: Why?)
and the present value of the terminal value is $1077.63.

Another approach is to assume that there may be a higher rate of growth for a certain number of years following the terminal year, and that the growth rate slows to a lower, long-run, sustainable level. In that case, the cash flows with the finite-period higher growth rate would be valued as an annuity, and the subsequent cash flows valued as a perpetuity at the lower growth rate and discounted back to the terminal year. Of course, the sum of both values would then be discounted back to the present.

3) Equivalence of the Two Methods

- You may have noticed that in the examples used with both methods above, we came up with the same present value of terminal value, $1077.63. This was not an accident—the examples were rigged to be consistent.

- The consistency of the two examples is telling us is something important: Given a WACC of 10%, a cash flow-multiple of 21 is equivalent to a growth-adjusted discount rate of 5%. (In the example above, recall that the WACC is 10% and g is 5%; therefore, the growth-adjusted discount rate, WACC – g, is 10% – 5% = 5%). More generally, the price-to-cash flow multiple is the same number as \([1 + g]/[WACC – g]\). For example, given \(g = 5\%\) and \(WACC = 10\%\), this works out to \(1.05/0.05 = 21\).

- This brings up an important issue: consistency. It is common for many valuations to discount cash flows with the WACC for the proforma years, and then to apply the multiples valuation method for the terminal cash flow. It raises two questions: (i) Is the multiple consistent with the WACC that is being used, and (ii) What is the growth rate implicitly assumed by the multiple used, given the WACC?

- Given \(P/CF\) and WACC, the formula for calculating the implied growth rate, \(g\), is:

\[
g = \frac{([P/CF]*WACC – 1)}{([P/CF] + 1)}
\]

- For instance, if a multiple of 30 were used in the example above, the assumption that we are making is that the long-run expected annual growth rate, \(g\), is \((30*0.1 – 1)/31 = 6.45\%\), for an implied growth-adjusted discount rate of \(10\% – 6.45\% = 3.55\%\). This may or may not be valid, given industry, competitive, and other circumstances assumed in the valuations.

- In using (or evaluating) such shorthand approaches, it is important to understand the implicit assumptions being used, and their internal consistency. It may not be a source of comfort, but it does have the virtue of honesty!

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5 This approach is, for instance, advocated by the Boston Consulting Group in the use of its ‘CFROI’ model of valuation, based on the premise that competition will drive down the prospect of higher growth rates in the long run.

6 This can be derived by rearranging the formula \(P/CF = (1 + g)/(WACC – g)\) to bring \(g\) to the left hand side, and all other terms to the right hand side.
4) A Few Additional Comments on $g$

- Is there a ‘right’ $g$? The answer is ‘no.’ Picking the right $g$ is a matter of some judgment. Ultimately, it is a matter of whether we (or more importantly, the people investing in our project or firm) think it is a ‘reasonable’ number.

- One common approach is to assume that free cash flows will equal net income after the pro-forma period, and to calculate $g$ in net income as $\text{ROE} \times (1 – \text{Dividend Payout Ratio})$, where ROE is the company’s (accounting) return on equity. The logic is that, if the firm undertakes no new financing and if every incremental dollar reinvested in the firm can produce the same ROE as the assets-in-place, then the growth rate in assets (and cash flows) would be the proportion of the net income that is re-invested in the company, multiplied by the ROE. (But this formula is somewhat unsatisfactory because it relies on the book value of equity).

Yet another formula assumes that the firm will have a stable return on capital (ROC) after the pro-forma period. In this situation, the growth in operating income, $\text{EBIT} \times (1–t)$, will be the result of the firm’s reinvestment rate (i.e., % after-tax operating income invested Capex – Depreciation + $\Delta$NWC) and its ROC. More precisely, the growth in the firm’s EBIT, $g_{\text{EBIT}} = (\text{Reinvestment Rate}) \times (\text{ROC})$, where ROC is defined as EBIT*$(1–t)$ as a percentage of the total capital invested.

- In mature industry settings it would be reasonable (perhaps even conservative) to assume that real cash flows remain constant starting with the terminal year. If that is the assumption being made (and if the WACC is calculated in nominal rather than real terms), then a minimum $g$ to assume would be the long run expected inflation rate, $\pi$. In other words, $g = \pi$, and the terminal value in this case would be $\text{CF}_T(1 + \pi)/(\text{WACC} – \pi)$. (Note: If WACC is calculated in nominal terms and $g$ is assumed to be zero, then the valuation is implicitly assuming that the real cash flows are declining; many textbooks recommend this formula without recognizing this!).

- A Caveat: Choose $g$ with caution. Small changes in $g$ can lead to large swings in value. For instance, if we set $g = 6\%$ in the example above, the terminal value would become $(\$105/\{0.10 – 0.06\}) = \$2625$, a 25% increase!