"Lather, Rinse, Repeat: How We Discount the Terminal Value"

Seth Fliegler, MBA, CVA, CFE

Lather, rinse, repeat….lather, rinse repeat. Quite often there are actions that we perform simply because we are trained to do so and they have been executed repeatedly. Oftentimes, these actions are completed without any thought given as to their derivation because the reasoning was learned many years prior, if at all. At a training class I recently attended, one such type of repeated action was brought into the spotlight: in generating the present value of a terminal value in a discounted cash flow analysis, why does a valuation analyst discount the terminal value back using the last year of the projection period rather than the year after the last projected year? That is, if the last projection year is "n," why isn't the terminal year value discounted by "n+1"? The immediate response appeared to be lather, rinse, repeat—in other words, that is just how it is done. This article aims to provide a brief explanation to valuation analysts as to the reasoning behind the process of discounting the terminal value and to provide a fresh reminder of why it is we do what we do.

Equation 1

$$PV = \frac{CF_1}{c}$$

PV = Present value
CF = Free cash flow
c = capitalization rate

Equation 2

$$PV = \underbrace{\frac{CF_1}{(1+k)} + \frac{CF_2}{(1+k)^2} + \cdots + \frac{CF_n}{(1+k)^n}}_{\text{Stage 1}} + \underbrace{\frac{\frac{CF_n(1+g)}{k-g}}{(1+k)^n}}_{\text{Stage 2}}$$

PV = Present value
CF = Free cash flow
k = Discount rate
n = Number of periods in the discrete projection period
g = Long-term growth rate into perpetuity

The Income Approach and Present Value

The Income Approach to valuation provides for two principal methods of determining value based on future economic benefits: 1) the Capitalization Method (Equation 1), and 2) the Discounted Cash Flow Method[1] (Equation 2). In the Capitalization Method, a single, anticipated cash flow is converted to present value through the divisor called a capitalization rate.

Specifically, the cash flow (CF_1) is the cash flow expected in the period immediately following the valuation date. If the valuation date is time "0," then the cash flow applied in the capitalization method is CF_1, the cash flow in period 1. Further, these cash flows are expected to reflect stable, long-term growth. The capitalization rate, "c," is the rate at which the cash flow in period "1" is discounted to the valuation date.

Under the Discounted Cash Flow Method, the value of a business is estimated as the sum of two components: 1) the present value of expected future operating cash flows for a finite projection period (discounted at a rate that reflects the time value of money and the nondiversifiable risk of the cash flows); and 2) the present value of the estimated terminal value (the value of operating cash flows expected to be realized subsequent to the projection period). Algebraically, the present value of an entity using a discounted cash flow model is shown in Equation 2 above.[2]

The last portion of Equation 2 (Stage 2) reflects the terminal value. A valuation analyst can arrive at the terminal value in a variety of ways, including the capitalization of ongoing economic income (*e.g.*, a Gordon Growth Model) or an estimated market multiple of the projected economic income for the last year to the projection period. In the equation above, a Gordon Growth Model is applied, which essentially inserts the capitalization model described above (Equation 1) at the end of the discrete

1 The Excess Earnings Method, which combines the Income Approach and the Asset Approach, is another commonly used valuation method applying the Income Approach.

2 For further analysis, see, Shannon P. Pratt, and Alina V. Niculita, *Valuing a Business: The Analysis and Appraisal of Closely Held Companies,* McGraw Hill, Fifth Edition, Chapter 10.

projection period of the discounted cash flow model. This process is sometimes referred to as the Two-Stage Model (the first stage being the discrete projection period [Stage 1] and the second being the terminal value generated through the capitalization model [Stage 2]).

Yet it is the use of "n" in the denominator of the terminal value in Equation 2 that had generated much consternation (and today is accepted as given). If the terminal value reflects the cash flow of the last year of the projection period times the growth rate (*i.e.*, CF_n (1+g)), why isn't this value discounted back by "n+1" rather than just "n"? For example, if the valuation date is January 1, 2000 and the discrete projection period ends December 31, 2005, why is the terminal value discounted from December 31, 2005 (n) and not December 31, 2006 (n+1)?

The answer lies in the fact that Equation 2 assumes that the terminal value reflects cash flows received just after the last discrete projection period. In other words, the terminal value cash flows are received at the very end of the last projection period or, said differently, at the very beginning of the subsequent projection period.

To simplify, if the last discrete projection period (n) in Equation 2 is assumed to be the valuation date, then the terminal value (Stage 2) simply becomes Equation 1:

$$Terminal\ Value = \frac{CF_1}{c}$$

and reflects the present value of the future cash flows as of the last period of the discrete projection period (*i.e.*, n). However, since the valuation date in Equation 2 is at some time period prior to the last discrete projection period, both the last discrete projection period and the terminal value are discounted back to the valuation date using the same number of periods (*i.e.*, n).[3] In keeping with the example above where the discrete projection period extends to December 31, 2005, the terminal value is calculated to be the present value of the future cash flows essentially as of December 31, 2005. As a result, both the terminal value and the last discrete projection period (*i.e.*, as of December 31, 2005) will be discounted using the same number of periods (*i.e.*, 6 periods) back to the valuation date, January 1, 2000.

Conclusion

The terminal value in a discounted cash flow model can be viewed as the capitalization model attached to a discrete projection period. Since the terminal value reflects future cash flows as of that last projection period, the terminal value and the last discrete projection period are discounted by the same number of projection periods. Valuation analysts can now comfortably project, discount, and repeat knowing why it is we do what we do.

3 For additional resources, see Shannon P. Pratt and Roger J. Grabowski, *Cost of Capital: Applications and Examples*, Wiley, Fifth Edition, 48.

Seth Fliegler, MBA, CVA, CFE, is a director in the Morristown, New Jersey, office of Duff & Phelps, LLC. Mr. Fliegler is part of the Dispute Consulting practice and has more than 15 years of experience assisting clients in business valuation and economic and financial analyses particularly within the financial services industry. Mr. Fliegler advises clients on topics related to valuation, solvency, commercial and economic damages, and fraud investigations. He can be reached at seth.fliegler@duffandphelps.com.