Explaining the Discounted Cash Flow Method

By Shawn Hyde, CBA, CVA, CMEA

The value of an operating company generating significant profits is typically based on its expected future earnings. That being said, how many people know exactly what their future earnings are going to be each year over the next five years? One of the key assumptions of the Discounted Cash Flow method is the projection of these future earnings. If company management doesn’t prepare forecasts, then it falls to someone else to prepare them.

In order to develop projections for the next five years, it is necessary to investigate the current economic and industry forecasts applicable to the subject as well as taking into account expected changes in operations for the company. Does management plan on investing in a larger facility, or is the company downsizing its workforce? Are they considering purchasing equipment to facilitate expansion into a new line of business, or are they experiencing credit problems and finding it difficult to borrow needed capital?

All business appraisals using an income based method include a projection. In many cases, it is appropriate to simply assume that operations will continue similarly to what occurred in the previous year(s). However, for those operating businesses where future growth is expected to vary, the discounted cash flow method should be used. This method relies upon projected earnings and the concept of the time value of money.

The time value of money means that a dollar received today, is worth more than a dollar received a year from now. The mathematical representation of this statement is shown below:

\[
\text{Present value} = \frac{\text{Income}}{(1+\text{Discount rate})^{\text{Time}}}
\]

(On a side-note, the result of the denominator in the equation above is referred to later on in this article as the “present value factor”.) Assuming a discount rate of 24%, one dollar to be received one year from now would be worth eighty-one cents today, as shown below:

\[
$0.81 = \frac{$1.00}{1.24^1}
\]

This principle can be seen in real life as winners of big lotteries tend to elect to receive their winnings in one lump sum, as opposed to waiting to receive them over time. If the $1,000,000 prize were taken in $50,000 annual payments, the winner would receive $1,000,000 over 20 years. Using a 24% discount rate, that $1,000,000 prize received today would only be worth $810,000, rounded. The DCF applies the time value of money to the various income streams a business owner would receive over a number of years, including the value of a potential sale of the business once growth has stabilized.

One example of a business with expected varying income streams is a startup. A brand new business, if it survives long enough to be successful, would see much faster growth in the first couple of years than in the next several years of operations.

A second example is a business that is planning significant capital expenditures that will result in significant changes in expected growth.
A third example is a business that has an expected shelf life or is winding down operations.

In each of these scenarios, the DCF method is appropriate and would provide a much stronger analysis of the expected value of the subject company than any other income based method.

To apply the DCF method, it is necessary to project the future earnings of the business as far out into the future as is necessary to reach a point of stability. Once the variance in year over year growth has passed, the DCF method assumes the business is sold at that date and the proceeds from the sale are included in the present value calculation. The following example illustrates the calculation of the present value of the projected income streams:

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected net cash flow</th>
<th>Divide - present value factor</th>
<th>Present value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013E</td>
<td>$100,000</td>
<td>1.11355</td>
<td>$89,803</td>
</tr>
<tr>
<td>2014E</td>
<td>$140,000</td>
<td>1.38081</td>
<td>$101,390</td>
</tr>
<tr>
<td>2015E</td>
<td>$180,000</td>
<td>1.71220</td>
<td>$105,128</td>
</tr>
<tr>
<td>2016E</td>
<td>$190,000</td>
<td>2.12313</td>
<td>$89,491</td>
</tr>
<tr>
<td>2017E</td>
<td>$195,700</td>
<td>2.63268</td>
<td>$74,069</td>
</tr>
</tbody>
</table>

As shown, the projected earnings of this company are expected to vary over time, growing by 40.0% in 2014, 28.6% in 2015, 5.6% in 2016, and dropping to a long-term sustainable growth rate of 3% in 2017. Each projected income stream is divided by the present value factor described above with one difference. In the previous discussion about the value of a dollar, we waited a full year before receiving payment. Most businesses do not wait a full 12 months before receiving all their income. In order to factor this difference into the DCF method, the time period described in the first equation shown, is modified to the mid-year convention. This means the power of time changes from representing a full year, to a mid-year as shown below: (Note that the mid-year convention calculation results in a higher value as the investor is assumed to have earned their return throughout the year, as opposed to waiting until the end.)

\[
\begin{align*}
2013E \text{ - Mid-Year Convention} & \quad \frac{\$89,803}{1.24^{0.5}} = \frac{\$100,000}{1.24^1} \\
2013E \text{ - End of Year Convention} & \quad = \frac{\$80,645}{1.24^1}
\end{align*}
\]

Next, the terminal value needs to be calculated. The terminal value represents the value of the business after the point of stability is reached, or in other words, the point when the method considers a potential sale of the business. The projected net cash flow in the terminal year is increased by a determined growth rate, then divided by the company’s capitalization rate to arrive at a value as of that future point in time (December 31, 2017 in this example). That value is then discounted to present and added to the sum of the present values of the projected earnings to arrive at the conclusion of value for the subject company as shown below:
### Terminal Value Calculation

<table>
<thead>
<tr>
<th>Year</th>
<th>Projected Net Cash Flow</th>
<th>Terminal Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013E</td>
<td>$100,000</td>
<td></td>
</tr>
<tr>
<td>2014E</td>
<td>$140,000</td>
<td></td>
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<td>$195,700</td>
<td></td>
</tr>
</tbody>
</table>

**2017E's Projected Net Cash Flow:** $195,700

**Times:** 1 + the expected long-term sustainable growth rate of 3.0% = 1.03

**Next Year's Projected Net Cash Flow:** $201,571

**Divided by the Capitalization Rate:** 21.0%

**Indicated Value as of December 31, 2017:** $959,862

**Projected Future Benefit Streams:**
- $100,000
- $140,000
- $180,000
- $190,000
- $195,700

**Present Value:**
- $1.11355
- $1.38081
- $1.71220
- $2.12313
- $2.63268

**Sum of the Present Value of Projected Future Benefit Streams - Rounded:** $820,000

Please note that the present value factor used on the terminal year is exactly the same as the one used in the last projected year. The logic behind this, is that the sale occurs on the day immediately after the conclusion of the 2017 year. Since the difference in time periods is less than 24 hours, no difference in the present value factor is required.

### Summary

The application of the DCF method involves many steps, but the knowledgeable team of valuation experts at Yeo & Yeo, P.C. understand the method and its underlying assumptions. If you have any questions or would like assistance with a business valuation assignment, please give us a call.

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