

# How to Estimate the Long-Term Growth Rate in the Discounted Cash Flow Method

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*In forensic analysis engagements where the value of a company or security is disputed, one topic that the litigants often disagree about is the selection of the expected long-term growth rate used in the discounted cash flow method. The expected long-term growth rate may be contested because (1) small changes in the selected growth rate can lead to large changes in the concluded business or security value and (2) the long-term growth rate is a judgment-based valuation input. Because of these two factors, judges, mediators, and arbitrators may view the analyst's selected long-term growth rate skeptically. This discussion provides qualitative and quantitative factors that analysts may consider to support the selection of an expected long-term growth rate.*

## INTRODUCTION

Valuation analysts are often retained to estimate the fair value or fair market value of a company or security for a variety of forensic analysis purposes, including taxation, bankruptcy, lender liability, shareholder disputes, GAAP compliance, intellectual property infringement, contract dispute, condemnation/ eminent domain, and other controversies.

In these assignments, the valuation analyst may consider the income approach and, specifically, the discounted cash flow (DCF) method to value the subject company or security.

This discussion focuses on the procedure to estimate one of the important valuation variables in the DCF method: the subject company's expected long-term cash flow growth rate in perpetuity.

The Delaware Chancery Court (the "Chancery Court") "is widely recognized as the nation's pre-eminent forum for the determination of disputes involving the internal affairs of the thousands upon thousands of Delaware corporations and other business entities through which a vast amount of the world's commercial affairs [are] conducted."<sup>1</sup>

The Chancery Court has noted that the DCF method is a generally accepted method to value a business or security. In particular, the Chancery

Court notes that "the DCF [method] has featured prominently in this Chancery Court because it 'is the approach that merits the greatest confidence within the financial community'"<sup>2</sup> and "if a [DCF method] reveals a valuation similar to a comparable companies or comparable transactions analysis, [the Chancery Court has] more confidence that both analyses are accurately valuing a company."<sup>3</sup>

The DCF method involves a projection of the company's results of operation for a discrete, multi-year period. The discrete cash flow projection is then converted to a single present value. The DCF method typically involves a terminal value analysis at the end of the discrete projection period.

The terminal value is "the present value of the stabilized benefit stream capitalized into the future,"<sup>4</sup> where the future represents all periods after the discrete projection period.

In the DCF method, it is not uncommon for the terminal value to account for 75 percent or more of the total company or security value. This conclusion is especially true when there are fewer discrete projection periods between the valuation date and terminal period—that is, the terminal value accounts for more of the projected economic benefit of the company and thus a higher proportion of the total value.<sup>5</sup>

The Gordon growth model (GGM) is a method that is often used to calculate the terminal value in a DCF method analysis. This terminal value estimation model can be sensitive to the expected long-term growth (LTG) rate.<sup>6</sup> Because a small change to the LTG rate can have a large impact on the concluded value, the LTG rate is often one of the disputed variables in valuations prepared for forensic analysis purposes.

Figure 1 demonstrates the sensitivity of the concluded terminal value to the selected LTG rate (as calculated by the GGM), assuming the following illustrative valuation variables:

1. A 15 percent weighted average cost of capital (WACC)
2. A terminal period cash flow of \$10

As shown in Figure 1, an increase in the LTG rate from 3 percent to 4 percent causes an increase in the terminal value of 10 percent. An increase in the LTG rate from 5 to 6 percent causes an increase in the terminal value of 11 percent.<sup>7</sup>

Given the potential controversy regarding the selection of the LTG rate in the DCF method, this discussion considers the following topics:

1. How the LTG rate relates to (a) the subject company or security and (b) the concluded terminal value
2. The factors that affect the LTG rate selection

## THE GORDON GROWTH MODEL

As previously discussed, one common method used to calculate the DCF method terminal value is the Gordon growth model. The GGM formula<sup>8</sup> is presented as follows:

$$PV = (NCF_0 \times (1 + g)) \div (k - g)$$

where:

PV = Present value

$NCF_0$  = Net cash flow in the final discrete projection period<sup>9</sup>

$g$  = Selected long-term growth rate

$k$  = Selected cost of capital

The first procedure to calculate the terminal value using the GGM is to estimate the normalized long-term income stream (e.g., terminal period net cash flow, or NCF) at the end of the discrete projection period. This income stream should take into account the stable, normalized economic returns of the business.<sup>10</sup>

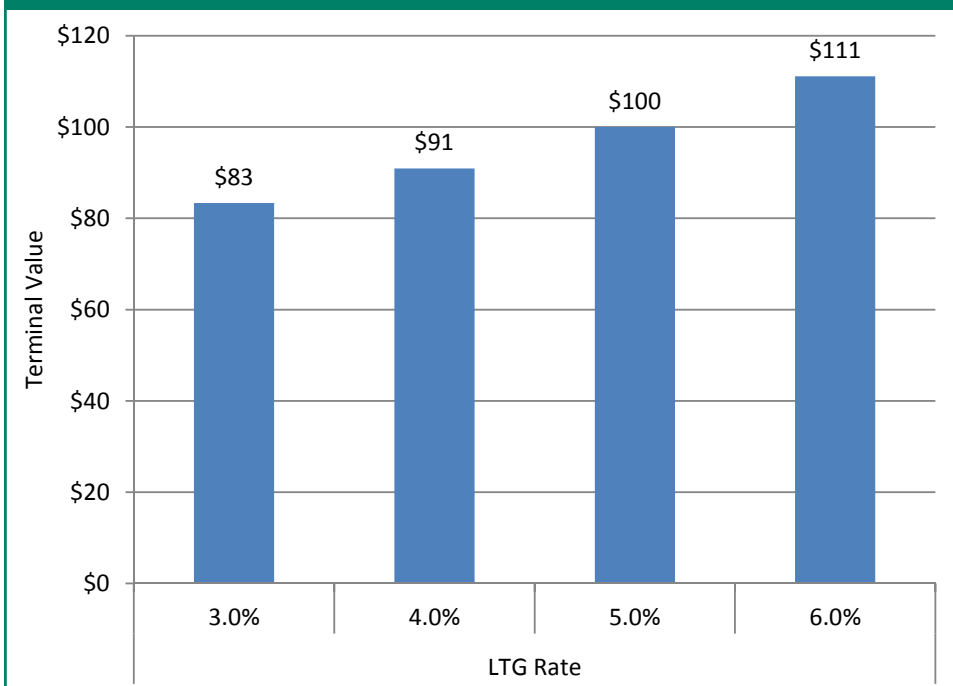
The next procedure in the GGM is to capitalize the terminal NCF at a risk and growth adjusted capitalization rate (i.e., the direct capitalization rate). The GGM estimates the terminal value based on the premise that the NCF will increase (or decrease) in perpetuity at a constant annual rate. The appropriate GGM direct capitalization rate equals the company WACC (which incorporates the risk of the company cash flow) minus the selected LTG rate (which incorporates the expected growth of the company cash flow).

Once the direct capitalization rate is calculated, the projected terminal period's NCF is divided by that direct capitalization rate to derive the terminal value.

Because the terminal value is calculated as of the end of the discrete projection period, the last procedure in the application of the GGM is to compute the present value of the terminal value.

The long-term growth rate is not used in this procedure. Instead, the same present value factor applied to the final discrete period's projected NCF is also applied to the terminal value in order to convert it to the present value as of the valuation date.

**Figure 1**  
Sensitivity of GGM to Selected LTG Rate



## LTG RATE DEFINITION

The terminal value incorporates the value of all the company's cash flow following the final discrete projection period, into perpetuity. That period is referred to as the "terminal period" for purposes of this discussion. As such, when an analyst selects a long-term growth rate, the analyst is effectively concluding that the company's cash flow will increase (or decrease) at the constant LTG rate forever.<sup>11</sup>

At first glance, it may seem unrealistic to assume that a company will experience positive (or negative) growth forever—especially if the analyst selects a growth rate that is greater than the projected rate of inflation (and, in doing so, implicitly projects that the company will grow to infinite size over infinite time). However, the majority of the terminal value is generated by the cash flow that occurs within the first few periods beyond the discrete projection periods.

Therefore, when the analyst selects a LTG rate for the GGM, he or she is essentially estimating the annual percentage changes in a company's cash flow over the first 10 to 20 years beyond the terminal period.

The GGM is a formula to calculate the net present value (i.e., the "terminal value") for all future periods into perpetuity. In essence, it is a collapsed version of the formula that represents a summation of the present value of each individual period in the

terminal period discounted to the beginning of the terminal period at the direct capitalization rate.

Because the direct capitalization rate equals the selected WACC minus the selected LTG, the proportion of the terminal value that is generated in each successive period depends on the spread between these two figures.

In other words, given the same WACC, a lower LTG rate causes a higher proportion of terminal value to be generated in the near term, while a higher LTG rate causes the opposite result.

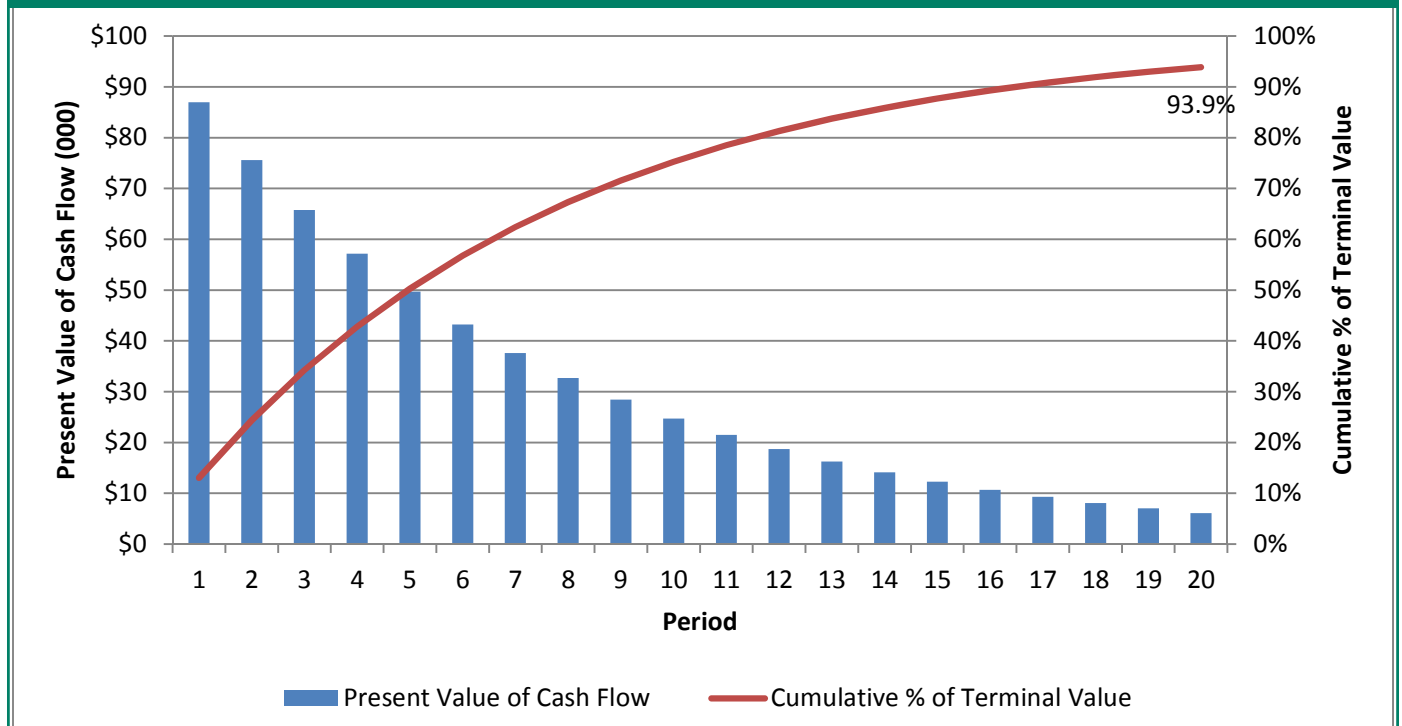
This is because a higher LTG rate causes cash flow to increase more rapidly into the future, which consequently causes future periods to have relatively higher present values.

Figures 2 through 4 graphically present the annual and cumulative percentage of the terminal value in the first 20 years of the terminal period, based on the following valuation variables:

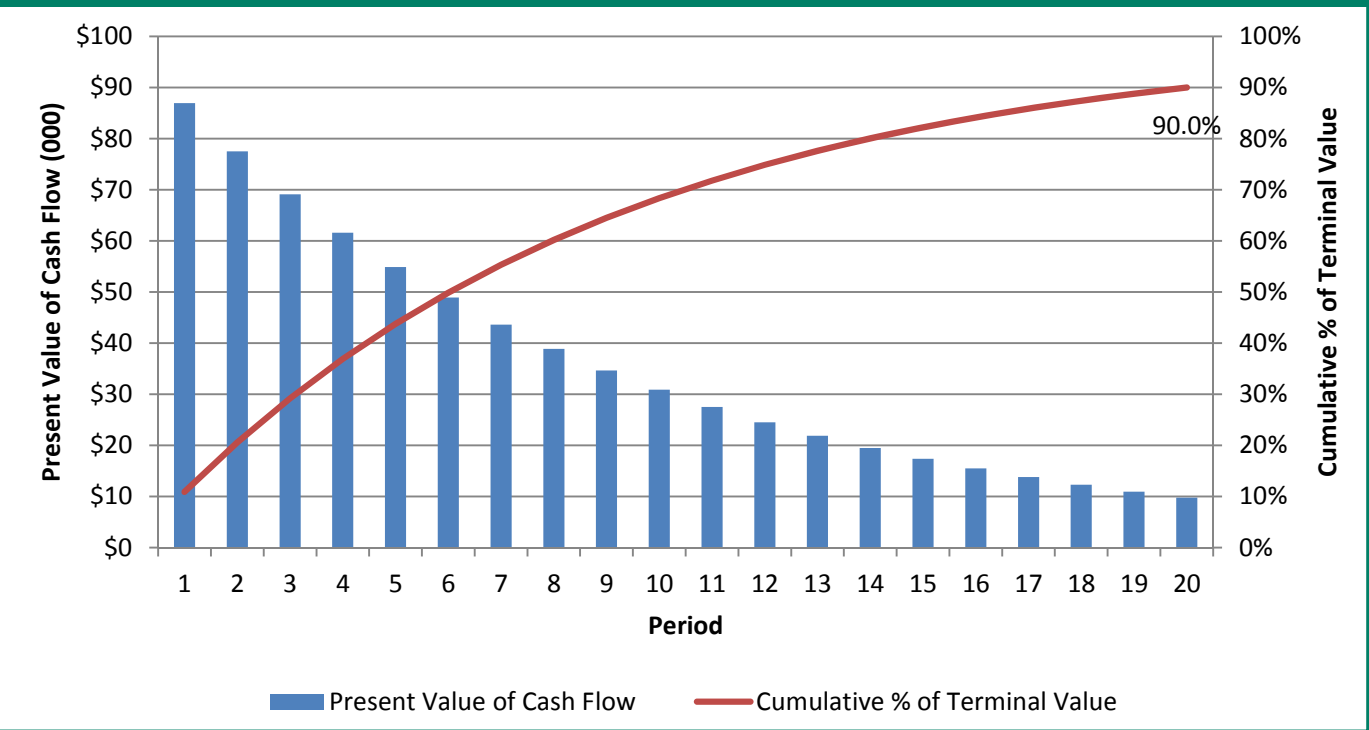
1. A WACC of 15 percent
2. Normalized cash flow in the first terminal period of \$100
3. LTG rates between 0 percent and 5 percent<sup>12</sup>

The vertical bars in Figures 2 through 4 present the present value of annual cash flow during the terminal period and the curved horizontal line

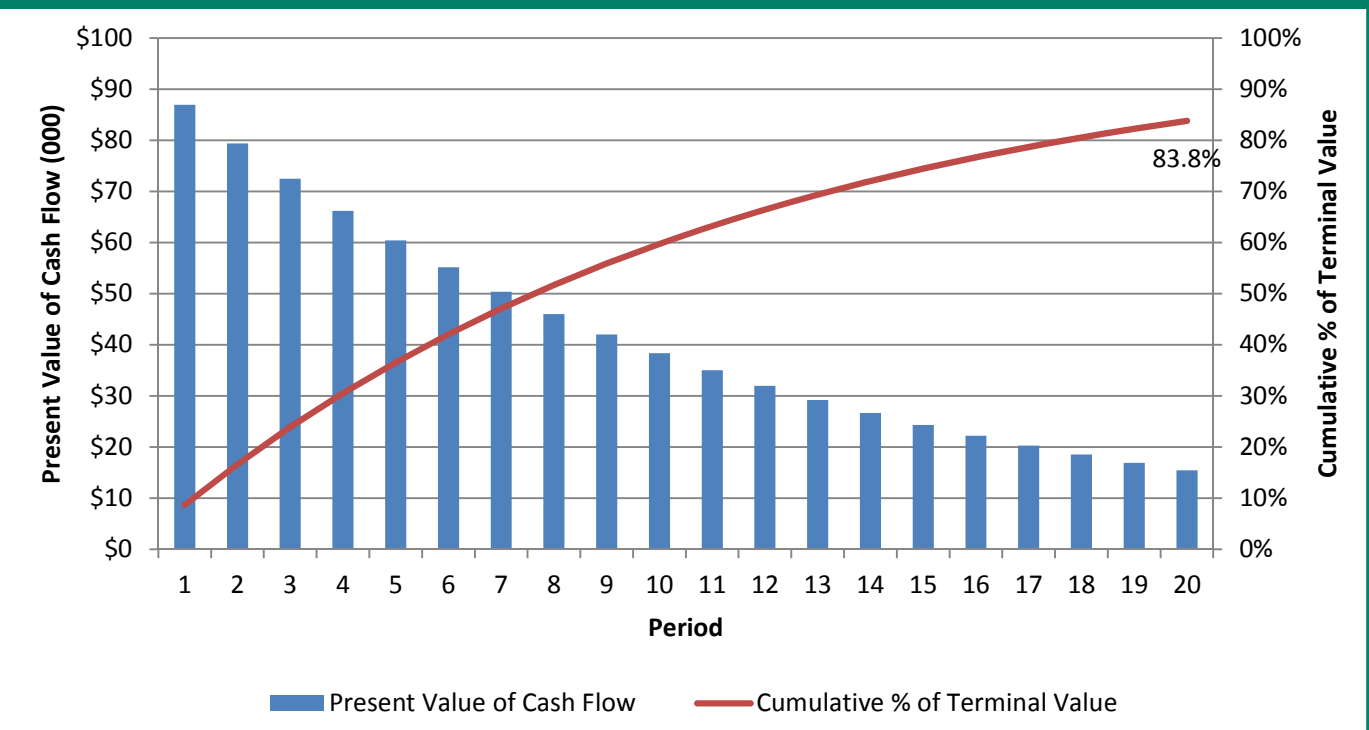
**Figure 2**  
WACC 15 Percent, LTG 0 Percent



**Figure 3**  
WACC 15 Percent, LTG 2.5 Percent



**Figure 4**  
WACC 15 Percent, LTG 5 Percent



presents the cumulative percentage of the total terminal value of the presented cash flow for periods 1 through 20.

Figure 2 demonstrates that with a selected LTG rate of 0 percent, periods 1 through 20 account for 93.9 percent of the terminal value. Figure 3 demonstrates that with a selected LTG rate of 2.5 percent, periods 1 through 20 account for 90.0 percent of the terminal value.

Figure 4 demonstrates that with a selected LTG of 5.0 percent, periods 1 through 20 account for 83.8 percent of the terminal value.

The positive correlation between the LTG rate and the proportion of value generated in later periods is paradoxical. Later projection periods and higher selected LTG rates generally drive a greater degree of uncertainty, which means that selecting a higher LTG rate causes uncertainty in later periods to be amplified by their relatively increased proportion of the terminal value.

Nonetheless, this concern is usually mitigated by the fact that the amplitude of this effect is generally somewhat small—that is, sooner periods still generate a much larger proportion of terminal value than later periods, even when the selected LTG rate may be relatively large.

Because of the large proportion of the terminal value that is accounted for in the first 20 or so periods following the discrete projection period, it is possible to make a reasonable directional prediction about the subject company cash flow.

This directional cash flow prediction is captured by the LTG rate. As such, it is necessary that the analyst consider appropriate factors in the selection of the same.

## SELECTING THE LTG RATE

There are a number of issues that the analyst may consider in selecting an LTG rate. First, the analyst should be careful to match the selected growth rate and the inputs considered with the metric being measured—that is, cash flow.<sup>13</sup>

Second, the analyst should be careful to consider any and all appropriate (and not consider inappropriate) qualitative factors in the selection of the growth rate.

Third, the analyst should consider appropriate (and not consider inappropriate) quantitative factors in the selection of the growth rate.

The next section summarizes the quantitative and qualitative factors that analysts may consider when selecting an LTG rate in the application of the GGM.

## Qualitative Considerations

Some valuation analysts consider the subject company's LTG rate only in terms of historical growth, near-term projected growth, projected or historical inflation, or another similar measurable financial metric. Those factors are all considerations in the selection of the LTG rate.

However, when selecting an LTG rate, the analyst should also have a general understanding from a business perspective of what factors contribute to the subject company's growth. This understanding is important because the period covered by the LTG rate variable within the GGM may start so far into the future that the following may occur:

1. Precisely projecting the LTG rate is difficult.
2. It may not be practical or possible to pinpoint the specific company initiatives that will contribute to the company's growth.

Appropriate qualitative considerations may include an analysis of the historical and projected performance of the company, existing assets of the company, and management's strategy of acquisitions and/or new development.

According to *Investment Valuation, Tools and Techniques for Determining the Value of Any Asset* by Aswath Damodaran, a company's LTG rate should be "determined by a number of subjective factors—the quality of management, the strength of a firm's marketing, its capacity to form partnerships with other firms, and the management's strategic vision, among many others."<sup>14</sup>

Damodaran also includes reinvestment as a factor of a company's expected long-term growth rate. Damodaran writes that "defining reinvestment broadly to include acquisitions, research and development, and investments in marketing and distribution allows you to consider different ways in which firms can grow. For some firms like Cisco, reinvestment and growth come from acquisitions, while for other firms such as GE it may take the form of more traditional investments in plant and equipment."<sup>15</sup>

For any subject company, reinvestment may be viewed as coming from the following three sources:

1. Opportunities to exploit the existing assets
2. New internally developed assets
3. Acquisitions

Let's consider the LTG rate in the context of a hypothetical designer and manufacturer of women's accessories, GrippCo. Let's further assume that (1) the specific segment of the industry that GrippCo



competes in was in the growth stage of its life cycle and (2) the industry segment was fragmented.

The next sections explain the three sources of growth described above. And, the next section illustrates each source of growth using the GrippCo example.

### Growth From the Existing Assets

One category of LTG is from the subject company's existing assets, both tangible and intangible. This type of growth is probably what most analysts think of first when they think of the company's long-term growth. Examples of this type of growth include the following:

1. Selling more units of an existing product or service
2. Selling existing products or services at a greater selling price

The factors that the analyst may consider when assessing the expected subject company growth from the existing assets include, but are not limited to, the following:

1. The overall industry growth
2. The company's market share
3. Inflation (e.g., the potential to increase prices)
4. The growth of the existing assets prior to the terminal period

Note that factors one through three should be considered as of the terminal period. For example, if the subject company has projected that it will increase its market position from the tenth largest competitor to the first largest competitor during the discrete projection period, then the company's ability to grow by selling additional units in the terminal period may be limited.

Likewise, if the industry growth is expected to be rapid during the discrete projection period and slow in the subsequent years, then the analyst should focus on the slower, second phase of industry growth.

Since GrippCo has a small market share, it is possible for the company to grow from both of the following conditions:

1. Increased accessory sales
2. Rising prices

Therefore, the valuation analyst may include GrippCo LTG from existing assets from selling a greater number of products at prices that increase around the same rate of inflation. In this scenario, the analyst could support a selected LTG rate for GrippCo from existing assets that is greater than the projected nominal growth rate for the economy.

### Growth Related to New Internally Developed Assets

Whether it is one year or 100 years, almost every product has a limited life. The stylish and branded GrippCo accessory that is manufactured and sold as of the valuation date will not be around in a decade; but GrippCo likely will be.

If the company does indeed survive 100 years, it will do so by redesigning its existing product offerings or expanding into related lines of business to stay competitive. That is, GrippCo will achieve long-term cash flow growth from new internally developed assets that it did not own as of the valuation date.

For some companies, like the hypothetical GrippCo, developing new assets is a critical component of the company's business plan. For companies like this, if the analyst only considers growth from existing assets in the LTG rate, he or she may understate the company's LTG rate.

Growth from new internally developed assets is more difficult to identify and support than growth from existing assets. This is because, by definition, the valuation analyst is projecting that cash flow will be generated from a product or an idea that hasn't been developed. The analyst is also assuming that this undeveloped idea will be commercially viable.



In spite of the difficulties in explicitly projecting this type of growth, growth from newly developed assets should still be considered. In fact, companies such as GrippCo only survive (1) by regularly reinventing themselves or (2) by “cannibalizing” their existing products with newly developed products.

In order to assess the likelihood and amount of LTG from new internally developed assets, the analyst may consider the following factors:

- The frequency of the subject company product launches. For example, if the subject company launches new products several times a year, then it may be reasonable to assume that it will frequently launch new products during the terminal period.
- The success of the subject company product launches. For example, if demand generally exceeds supply for the first production run of the subject company new products, then it may be reasonable to assume that the company will successfully launch new products during the terminal period.
- The level of innovation in the subject company industry. For example, growth from new internally developed products is more likely if the subject company competes in an innovative industry (e.g., the electronic computers industry) than if the subject company competes in a mature industry (e.g., the petroleum refining industry).

## Growth by Acquisitions

Another category of growth is growth by acquisitions. Growth by acquisitions can (1) create new company assets and (2) create and augment the company’s existing assets, including goodwill

Goodwill is the company’s business enterprise value in excess of the company individual tangible and intangible assets owned as of the valuation date.

The analyst may consider the following:

1. How likely the subject company is to make acquisitions during the terminal period
2. How much LTG is projected to come from acquisitions

The following discussion presents some specific factors that the analyst may consider to answer the two questions posed above:

- Whether or not the company was a historically acquisitive company. For example, if the subject company was created via an acquisition and reported a material number of acquisitions in the years preceding the

valuation date, then it may be reasonable to assume that the company will make a similar number of acquisitions in the future as it did in the past.

- The acquisition policy of company management. For example, if the board of directors’ minutes indicate that the subject company management was directed to make acquisitions, then it may be reasonable to assume that the company will grow by making acquisitions.
- The level of acquisition activity in the subject company industry. The analyst can review several of the merger and acquisition databases to analyze the number of transactions that occurred in the subject company industry in the years preceding the valuation date.

The level of acquisition activity in the industry may provide an indication of the company’s likelihood to complete acquisitions in the terminal period.

- The subject company’s projected ability, from a financial perspective, to make acquisitions. The analyst can review the historical financial statements as well as the financial statements projected for the discrete projection period.

Since the relevant period for analysis is the terminal period, the analyst should be most concerned with the company’s ability to make acquisitions at the start of the terminal period.

For example, if the company has planned a major capital expenditure financed with debt capital during the discrete projection period, it may be difficult for the company to complete acquisitions during the first part of the terminal period.

## Excluded Factors

In general, inappropriate considerations may include speculation, hypothetical situations, or opportunities which may have existed as of the analysis date but were as-of-yet unexploited. For valuations prepared for forensic purposes, the valuation analyst should understand how the relevant court (e.g., Tax Court, Delaware Chancery Court, Bankruptcy Court, etc.) has viewed the LTG rate selection in the DCF method.

It may be prudent for the analyst to consult with counsel in order to understand what specific considerations can and cannot be included in the LTG rate variable.

## Quantitative Considerations

Usually, it is also appropriate to consider and support the selected LTG rate with empirical data. Among other things, these data may include both of the following:

1. Company-specific information
2. Projected economic growth, both real and nominal

These data should be corroborative of the selected LTG rate. If qualitative data and quantitative data suggest different LTG rates, the analyst should understand and reconcile the differences.

An important source of information that an analyst can use when selecting an LTG rate is financial information from the company. This can include (1) historical financial information and (2) management-prepared projections

If the business was operating under similar business conditions, historical financial information is useful because it provides snapshots of the economic results of the business.

Management-prepared projections are useful because company management generally has a deep understanding of the economic drivers of the business and is able to isolate and predict the expected results of the business for a number of years into the future.

## Historical Financial Information

When a company is valued as a going concern, as is common in forensic circumstances, it is assumed that it will retain the functioning mechanisms that drove past economic returns.<sup>16</sup> As such, it is likely that the economic factors driving a company in the near past will continue to affect the company in the near future.

In other words, recent trends of increase or decrease in historical cash flow—if not caused by obvious changes in company operation—are often likely to carry on into the future.<sup>17</sup>

This can provide the analyst with a useful idea of what may constitute a reasonable LTG rate for the company cash flow. This is especially true when the company has a long operating history and/or the analyst is able to identify specific factors that have driven these trends.

The age of the company is relevant to the consideration of historical financial trends for the following two reasons:

1. An older company is more likely to exhibit a stabilized economic condition.

2. More time periods provide more data to consider.

When a company has reported stable economic returns over a number of periods with operating conditions similar to those at the valuation date and there are not expected to be any subsequent material changes, trends in historical financial information can carry a significant amount of weight.

The U.S. District Court in Wisconsin observed that “[w]hen a business has a long track record, revenues can be forecasted with greater certainty, and the need to perform a finely calibrated analysis of the various factors affecting revenues may not be as acute.” On the other hand, financial trends in the historical financial information of young businesses may carry less weight, and making projections from such information is “notoriously difficult.” To do so, “the expert must look to other indicators, such as the track records of other firms that are comparable to the [business].”<sup>18</sup>

This implies that long-term historical trends are useful indicators of future trends, while short-term trends of a business may require a deeper understanding of their economic drivers to predict that they will continue into the future.

As an example, let’s consider three different businesses and the impact of their circumstances on the usefulness of their historical financial data in the selection of the LTG rate.

The first business, Company A, was founded three years ago. It is already showing profits and is expected to continue doing so, but it has volatile cash flow and a high dependence on two customers that are not secured by long-term contracts.

The second business, Company B, also has a three-year history, but has exhibited steadily growing cash flow (which is projected to continue increasing at a predictable rate) and no key customer dependence.

Company C has a 30-year operating history with steady cash flow that is increasing at a rate consistent with the industry, and it predicts no material business changes in the foreseeable future.

In the case of Company A, the business does not exhibit stabilized economic drivers, past cash flow is volatile, and customer relationships are uncertain. Therefore, the historical data may be less important when compared to management projections, industry projections and expectations, and/or other factors.

On the other hand, Company B’s historical financial information may be more useful than that



of Company A. This is because it appears that the Company B economic drivers are more predictable. The historical financial information of Company C would be more useful than that of Companies A or B. This is because it represents many data periods and demonstrates stable economic drivers that are expected to continue in the future.

When management prepared projections are available along with historical financial information, the two can and should be considered side-by-side. The specific factors of the company at hand will determine what information will carry the most weight and what quantitative methods the analyst may use to provide an indication of a supportable LTG rate.

## Management-Prepared Projections

Management-prepared financial projections are similarly useful to historical results of a business, especially if they provide further insight into the economic forces acting on the business. As noted in *Valuing a Business*, “[s]ince the value of a business interest ultimately depends on what the business will accomplish in the future, reasonable estimates of future expectations should help in arriving at a value.”<sup>19</sup>

Management-prepared projections also often form the basis for the discrete period projections used in the DCF method.

Reviewing management-prepared projections may be advantageous for a young business that has not exhibited stabilized economic returns. In these situations, the usefulness of historical financial information can be limited, given instability of the historical trends or the limited number of historical data points.

In this case, management’s projections over the discrete projection period may be more relevant than the subject company’s historical financial statements.

Another example of when management-prepared projections may be particularly helpful to estimate the LTG rate is when the subject company has recently undergone or is projected to undergo a material change in the business. This change could be the rollout of a new product line, closing a facility, or completing an acquisition that was in the diligence stage as of the valuation date.

In each of these examples, the subject company could operate differently as of the start of the terminal period compared to the valuation date, which could render the historical financial information less relevant.<sup>20</sup>

Sometimes, company management includes sufficient detail in the projected financial statements

for the analyst to identify the economic drivers that company management believes will affect the projected financial results of the business.

For example, the management-prepared projections may link projected gross domestic product growth with sales volume, and inflation with sales prices. In instances such as these, it is prudent for the analysts to examine the projected economic drivers of the company, as well as the projections themselves.

An examination of projections, coupled with an examination of historical information and the factors that affect similar businesses, can provide insight into the factors that management expects will affect the operation of the business. In this way, projections may provide a view of the LTG potential of a business in the terminal period.

When using management-prepared projections, an analyst may also consider the conditions and care under which the projections were prepared. If the projections were prepared for a purpose that could call their objectivity into question (e.g., they were prepared for litigation purposes where the litigants may hope to achieve a particular value range), an analyst may wish to take care when using these projections.

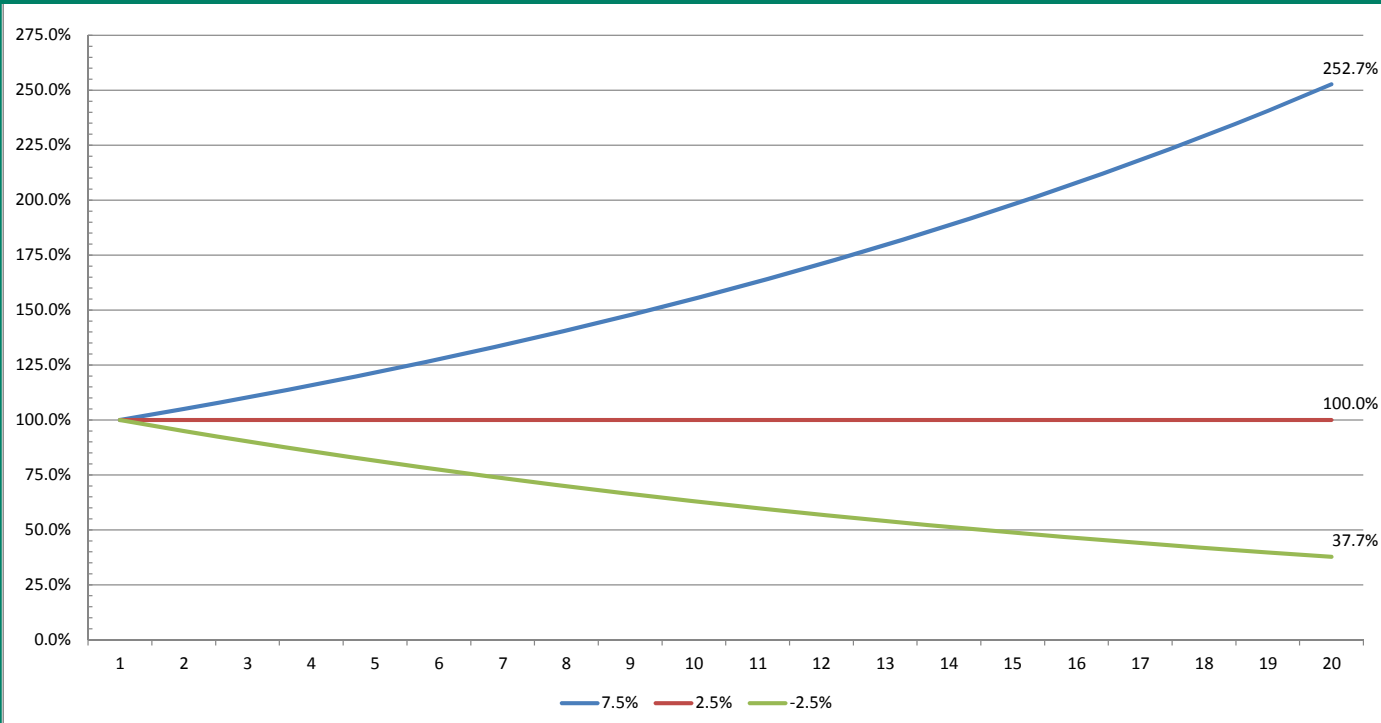
On the other hand, if the projections are more likely than not to be objective and realistic (e.g., the projections were relied on by a bank that provided financing and were prepared in the ordinary course of business), an analyst may consider carefully any adjustments he or she may wish to make to the management-prepared projections, or risk such adjustments being discarded during litigation.<sup>21</sup>

Consider again Companies A, B, and C, described above. Company A projections would likely be particularly important because, as mentioned, the historical financial information does not reflect stable economic drivers, cash flow, or customer relationships.

Management projections may help to isolate the factors that management expects to influence the company in the near future, driving its economic results. The projections of Company B would likely be nearly as important as those of Company A. This is because this company, though more stable than Company A, is likely to still be in its growth stage. Projections may show that the company is or is not expected to stabilize in the near future.

The projections of Company C would likely carry the least weight compared to the historical financial information. While still important, the business is not expecting any material business changes from

**Figure 5**  
**Real Effect of Nominal LTGs with 2.5 Percent Inflation**



the operating conditions reflected in the historical information. Therefore, the projections are likely to be an extrapolation of current financial results.

In any case, an analyst may balance reliance on historical financial information and management-prepared projections carefully, considering the facts and circumstances of the situation at hand.

If, for example, the historical results of a long-operating business and the management-prepared projections of the same show a sharp change in trends, the analyst may carefully consider management’s justification of this change and decide whether such change is realistic and appropriate.<sup>22</sup>

Projections can be useful to estimate the LTG rate, but they should be used carefully. As with historical financial information, the characteristics of the projections at hand will influence quantitative methods the analyst may wish to use to provide an indication of a supportable LTG rate.

### **Inflation**

Another important concern when selecting the LTG rate is the expected rate of inflation. In order to select a reasonable LTG rate, an analyst should understand the relationship between expected inflation and the growth of a business. And, the analyst should be able to explain that relationship.

Inflation is the “rise in the prices of goods and services . . . when spending increases relative to the supply of goods on the market”<sup>23</sup> and is a commonly forecast by economists.

By necessity, when all else is equal, this buoyancy on prices pressures all financial metrics of a company to increase at the same rate—that is, a company that is neither gaining nor losing ground will nonetheless see its cash flows increase over time at a rate equal to that of inflation.<sup>24</sup>

This is referred to as nominal growth; in an inflationary environment, a company that is not changing its economic position will still exhibit growth at the rate of inflation. Real growth, on the other hand, is growth that signifies the improvement in economic position of a business. If a company is exhibiting an improvement in economic position, it will exhibit real growth above and beyond the rate of inflation.<sup>25</sup>

In other words, if an analyst wants to select an LTG rate that reflects an improvement in the economic condition of a business, he or she should forecast real growth.

When selecting the LTG rate, it is important to not only consider whether the selected numerical rate appears to be high or low on absolute terms. The valuation analyst may ask what constitutes a reasonable expectation regarding the change in

economic position of a company. Is the economic position of the company expected to improve or deteriorate over time?

If the company is expected to show improvement, the selected LTG rate should then be above the expected rate of inflation—and vice versa. The factors to consider in the expectation of change in the economic position of a company may include industry trends, expected real growth of the national economy (i.e., gross domestic product, or GDP), historical financial results and trends, or projected financial results and trends.

The relationship between growth rates and inflation is not linear. Figure 5 shows the real (i.e., inflation-adjusted) proportionate change in cash flows after 20 periods with 2.5 percent inflation and nominal growth rates of (1) 7.5 percent, (2) 2.5 percent, and (3) negative 2.5 percent.<sup>26</sup>

As demonstrated, the nominal 7.5 percent growth rate caused cash flow to increase, on a real basis, more than two and a half times over. The nominal growth rate of negative 2.5 percent, on the other hand, caused cash flows to decrease, on a real basis, by nearly two thirds. This relationship is exponential, meaning that for positive real growth rates, the effect increases dramatically after many periods.

Once an analyst has an idea of the direction of a company's real economic position, an effective way to choose an LTG rate may be to consider the following:

1. Determine the expected rate of real change in economic position of the company
2. Incorporate this rate to the long-term expected rate of inflation

Such a procedure may allow an analyst to account for expected inflation in a reasonable and supportable manner. However, not every inflation estimate is always appropriate.

If a risk-free rate is being used in the estimation of a discount rate, it may be prudent to use an inflation forecast that matches the maturity period of the instrument that is being used as a proxy for the risk-free rate.

This is because instruments such as non-inflation-adjusted U.S. government bonds, which are often used as proxies for the risk-free rate, include an implicit expectation of a certain rate of inflation during the term of the bond. Thereby, internal consistency is improved if the term of the risk-free proxy instrument and the term of the rate of expected inflation are matched.<sup>27</sup>

## Relation of Inflation and Economic Growth

The concepts of real and nominal growth, described above, also apply to the economy as a whole. Inflation, as mentioned, is the upward buoyancy of prices due to an increase in the money supply—however, this can and does happen simultaneously with a real increase in the output of an economy (in this case, the gross domestic product, or GDP).

The product of the real growth in an economy and the inflationary (i.e., nominal) growth in that economy equals the total nominal growth of the economy, or the nominal growth of GDP.<sup>28</sup>

Let's consider, for example, real inflation growth that was projected at 2.4 percent and real GDP growth that was projected at 2.6 percent. Based on these expected growth rates, the projected total nominal growth rate of the economy is 5.1 percent.

In addition to considering the buoyancy on company financial metrics that come as a result of inflation alone, an analyst may consider the LTG prospects of a company relative to the nominal growth of the economy.

In other words, if both inflationary growth and GDP growth are expected to occur, a company's financial prospects may be more positive than if only inflationary growth were expected—thus supporting the case for a potentially higher growth rate.

## CONCLUSION

The selection of the LTG rate is an important component in the DCF method of valuing a business or security. It is incorporated into the calculation of the terminal value of the DCF method—which often accounts for a large proportion of the value of the business or security. The GGM, which is often used to conclude the terminal value in the DCF method, is sensitive to changes in the LTG rate.

In spite of how frequently it is estimated, the LTG rate is often selected based on either a consideration or inappropriate factors or a failure to properly consider the appropriate factors. For these reasons it is important that an analyst understand the factors that affect the LTG rate in order to select a supportable rate.

Sources of information that may be considered in the selection of an LTG rate include the following:

1. Qualitative factors such as organic or inorganic growth strategies
2. Quantitative factors, including the following:
  - a. Historical financial information
  - b. Management-prepared projections
  - c. Expected inflation and/or real growth in the general economy

None of these factors may be considered by itself. All of these factors may be considered concurrently. And, the interrelation of these factors may be evaluated to arrive at the appropriate reliance on information from each source.

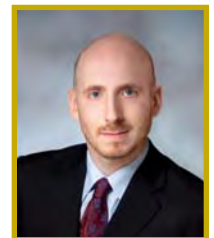
The specific situation at hand, including the purpose of the valuation, the operating conditions of the business, and the dependability of the information, influence the extent to which an analyst should rely on each source of data.

Notes:

1. <http://courts.state.de.us/chancery/>
2. Cede & Co. v. JRC Acquisition Corp., 2004 WL 286963, at \*2 (Del.Ch. Feb.10, 2004) (quoting Ryan v. Tad's Enters., Inc., 709 A.2d 682, 702 (Del.Ch. 1996)).
3. In re Hanover Direct, Inc. Shareholders Litigation, 2010 WL 3959399, at \*2 (Del.Ch. Sept. 24, 2010).
4. Gary Trugman, *Understanding Business Valuation*, 4th ed. (New York: American Institute of Certified Public Accountants, Inc., 2012), 428.
5. Shannon P. Pratt and Roger J. Grabowski, *Cost of Capital: Applications and Examples*, 4th ed. (Hoboken, NJ: John Wiley & Sons, Inc., 2010), 34.
6. Shannon P. Pratt, *Valuing a Business: The Analysis and Appraisal of Closely Held Companies*, 5th ed. (New York: McGraw-Hill, 2008), 243.
7. The proportional effect of the selected LTG rate increases as the LTG rate approaches the WACC. See Aswath Damodaran, *Damodaran on Valuation*, 2nd ed. (Hoboken, NJ: John Wiley & Sons, Inc., 2006), 145.
8. Pratt, *Valuing a Business*, 30.
9. NCF in the terminal projection period is often calculated as  $NCF \text{ in the final discrete projection period} \times (1 + \text{selected LTG rate})$ , as represented in the GGM formula presented. It should be noted that there may be other valid ways to project terminal NCF.
10. *Ibid*, 247.
11. Damodaran, *Damodaran on Valuation*, 145.
12. The end-of-period convention is used in the present value calculations.
13. It is entirely possible for a company to realistically forecast increasing cash flows while simultaneously forecasting decreasing revenue, net income, or other figures. For example, a manufacturing company might work to increase productivity and eliminate problematic customers—thus increasing its cash flow while decreasing its revenue—or a company that owns a television show may be subject to declining ratings on its programs but increasing cash flows on the same due to changing industry conditions.
14. Aswath Damodaran, *Investment Valuation, Tools and Techniques for Determining the Value of Any Asset*, 2nd ed. (New York: John Wiley & Sons, Inc., 2002), 300.

15. *Ibid*.
16. Jay E. Fishman, Shannon P. Pratt, and William J. Morrison, *Standards of Value: Theory and Applications* (Hoboken, NJ: John Wiley & Sons, Inc., 2007), 29.
17. Pratt, *Valuing a Business*, 79.
18. *Manpower, Inc. v. Insurance Co. of Pennsylvania*, 2010 WL 3730968, at \*3 (E.D. Wisc. Sept. 20, 2010).
19. Pratt, *Valuing a Business*, 88.
20. *Ibid*, 79.
21. See, for example, *WaveDivision Holdings, Inc. v. Millennium Digital Media Systems, LLC*, 2010 WL 3706624 (Del.Ch. Sept. 17, 2010) stating that the target's expert's valuation "relies on unreliable, self-interested, and thinly justified reductions" to the target's base case projections, which had been prepared for lenders pre-litigation and were "relied upon by a party—the bank—with a strong interest in getting repaid."
22. See *Manpower, Inc. v. Insurance Co. of Pennsylvania*, 2010 WL 3730968, (E.D. Wisc. Sept. 20, 2010).
23. John Downes and Jordan Elliot Goodman, *Dictionary of Finance and Investment Terms*, 6th ed. (New York: Barron's Educational Series, Inc., 2003), 332.
24. See, for example, *Lane v. Cancer Treatment Ctrs. of Am., Inc.*, 2004 WL 1752847, at \*31 (Del.Ch. July 30, 2004), "it must be assumed that [the company] would continue to grow at least at the rate of inflation;" and *Global GT LP v. Golden Telecom, Inc.*, 993 A.2d 497, 511 (Del.Ch. 2010), "the rate of inflation is the floor for a terminal value estimate for a solidly profitable company that does not have an identifiable risk of insolvency."
25. Pratt and Grabowski, *Cost of Capital*, 664.
26. These equate to real growth rates of 5.0 percent, 0 percent, and negative 5.0 percent, respectively.
27. See *Cost of Capital*, 89; *Valuing a Business*, 247.
28. This formula is  $(1 + \text{expected real GDP growth}) (1 + \text{expected inflation rate}) - 1 = \text{expected nominal GDP growth}$ .

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