Chapter 8

Valuation of Equity Interests in Complex Capital Structures

8.1 This chapter provides guidance regarding the valuation of equity interests for a portfolio company with a capital structure involving multiple classes of stock. Many (if not most) venture capital-backed and private equity-backed portfolio companies are financed by a combination of different classes of equity, each of which provides its holders with unique rights, privileges, and preferences (hereinafter referred to collectively as rights). Often, these portfolio companies issue both preferred and common shares and options or warrants, with the preferred stock comprising several series, resulting from successive rounds of financing, each of which has rights that likely differ from those of other series. When estimating the fair value of the fund’s investment, the fund should determine how each class of equity would participate in future distributions from a sale or other liquidity event, and the implications for the fair value of each class of equity.

8.2 Typically, portfolio companies with multiple classes of stock divide the classes into two broad categories: preferred and common. Sometimes, one of the principal objectives of issuing preferred stock—the granting of different rights to different groups of stockholders—may be achieved instead by issuing multiple classes of common stock or different classes of membership units in a limited liability company. The issues discussed in this chapter for valuing equity interests in complex capital structures apply not only to preferred versus common stock but also to any situations involving multiple classes of equity issued by a portfolio company wherein some classes have senior rights similar to those of holders of preferred stock.

8.3 Capital structures involving multiple classes of equity are often found in start-up portfolio companies funded by venture capital. Value creation in such portfolio companies is frequently a high-risk process. Venture capitalists may fund such portfolio companies beginning at an early stage of the portfolio company’s existence when the portfolio company may have an unproven business model, little or no infrastructure, an incomplete management team, and little or no short-term prospects of achieving a self-sustaining business with revenue, profits, or positive cash flows from operations. In spite of such challenges, such portfolio companies may draw significant capital from venture capitalists and other investors because of the potential for high returns in the event that the portfolio company is successful in achieving its plans.

8.4 Capital structures involving multiple classes of equity may also be found in larger portfolio companies funded by private equity. Private equity investors seek high returns through a variety of strategies (for example, acquiring well-run companies that can be used as a platform for expansion [a "roll up"] or acquiring poorly run companies in which profitability can be improved through better management [a "turnaround"]). In many cases, private equity investors also increase the risk and reward profile for their equity investments through leverage.
In view of the high risks associated with their investments, venture capital and private equity investors typically seek downside protection and significant control or influence over the portfolio companies’ activities. Thus, in many cases, in exchange for cash investments in the portfolio company, investors may receive preferred stock that conveys various rights to its holders. For venture capital-backed portfolio companies, initial issuances of common stock are primarily to founders for nominal or no cash consideration. For private equity-backed portfolio companies, the initial shareholders in the acquired company may retain common stock, and in addition, common stock may be granted to key executives. In addition, employees are often granted options to purchase the portfolio company’s common stock or profits interests if the portfolio company is structured as a partnership or limited liability company. The result is that venture capital-backed and private equity-backed portfolio companies frequently have complex capital structures with various classes of stock involving different rights:

a. Venture capital-backed companies are often funded through a series of financing rounds, which are usually negotiated independently and often involve different investors; thus, the capital structure may include many different classes of preferred stock with different rights and preferences.

b. Private equity-backed companies are often funded through a large initial investment to buy out existing shareholders, and a new capital structure is often put in place in connection with this investment. Private equity investors are also more likely to set up a holding company as a limited liability company, using profits interests as compensation for key executives.

c. Another capital structure used by some private equity funds is for the investors to receive both a debt instrument or debt-like preferred stock with a specified cumulative dividend rate (sometimes referred to as the hurdle rate), as well as the majority of the common stock, reserving a fraction of the common stock as a compensation pool for executives. In this structure, all investors receive both preferred and common stock, so even at the initial investment date, the transaction included multiple instruments, so the preferred stock cannot be assumed to be worth its face value without further analysis. If the leverage (debt divided by total invested capital) on the debt or preferred stock falls within the observable range for commercial debt issuances, the PE/VC Task Force (task force) believes that the best practice for estimating the fair value of a debt-like preferred stock is the yield method, which is described in paragraphs 6.09–18. This approach captures the required return on the debt or debt-like preferred investment, allowing for the fact that the investors have control of the timing of exit, similar to the control that covenants provide to commercial debt investments. If the leverage on the investors’ debt or preferred stock holding falls outside the observable range for commercial debt issuances (for example, if the principal value is set at 90 or 100 percent of the total invested capital), then the common stock may be considered as an option.

Estimating the value of the different classes of equity in a portfolio company requires an understanding of the rights associated with each class. Such rights are meaningful,
substantive rights and often are intensely negotiated and bargained for by the investors.\(^1\) The holders of the preferred instruments often structure the associated rights to allow the holders to control the business and direct the company’s operations.

8.7 Almost all venture capital-backed and private equity-backed companies will ultimately seek liquidity through an initial public offering (IPO) or sale of the company; thus, the methods in this chapter focus on estimating the fair value of the different classes of equity based on the future payoffs at the time of the liquidity event. However, there are other situations in which a company with a complex capital structure may remain private indefinitely. In these situations, the liquidity event should be considered to be the event in which the preferred stock is to be redeemed or repurchased. Examples include the following:

   a. In rare instances, a venture capital-backed company will "go private" by acquiring the preferred stock from outside investors. In this situation, the company typically retires the preferred stock at the repurchase date, and this repurchase may be treated as a "liquidity event."

   b. Many family-owned or other closely held businesses have simple capital structures. (See chapter 7, "Valuation of Equity Interests in Simple Capital Structures.") However, when these businesses raise capital from private equity or venture capital investors without creating a new class of equity, the investment is often accompanied by various side agreements. In these situations or when such a business has a more complicated capital structure, the fund will need to consider the specific facts and circumstances, considering the time frame until the resolution of the uncertainties relating to the future payoffs to the investment. Note that when a fund makes a minority investment in such a business, the fund will typically negotiate a path to liquidity (for example, a put right or mandatory redemption feature that forces the company to repurchase the investment at the higher of cost or fair market value or a negotiated formula price after a specified amount of time.\(^2\)). Such liquidity rights should also be considered when estimating the fair value of the investment.

8.8 For simple capital structures (that is, capital structures that include only common stock plus debt, debt-like preferred instruments, or both), it is possible to estimate the value of the equity interests in the portfolio company by directly estimating the value of any debt and debt-like preferred instruments as discussed in paragraphs 6.19–.31, subtracting those values from the total enterprise value, then allocating the residual equity value pro rata to the common stock. See chapter 7, “Valuation of Equity Interests in Simple Capital Structures.”

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\(^1\)The terms meaningful and substantive, as applied to rights, are used in this chapter to describe preferred stock rights that are important to a venture capitalist or private equity investor, in the sense that those rights provide the investor a level of control and influence that he or she requires in order to invest in the portfolio company.

\(^2\) See also case study 6, Impact on Value of Senior Equity Interests when Junior Equity Interests have Control, in appendix C, "Valuation Case Studies," describing the valuation of a minority investment in a joint venture where the junior instruments retained control, but the investors held a put right.
Structures.” Thus, the more sophisticated methods discussed later in this chapter may not be required in this circumstance.

Rights Associated With Preferred Stock

8.9 The rights received by preferred stockholders may be divided into two broad categories: direct economic rights and non-economic rights. Economic rights are designed to facilitate better economic results for preferred stockholders as compared with common stockholders. Those rights relate to the timing, preference, and amounts of returns the preferred stockholders receive as compared with the holders of other classes of stock. Non-economic rights provide preferred stockholders with the ability to influence the portfolio company in a manner that is disproportionate to their ownership percentages.

8.10 The following are some of the typical economic rights enjoyed by preferred stockholders (which are discussed in detail in appendix B, paragraphs B.07.03–.07.15):

a. Preferred liquidation preferences and seniority
b. Preferred dividends
c. Mandatory redemption rights
d. Conversion rights
e. Participation rights
f. Antidilution rights
g. Registration rights

8.11 The following are some of the typical non-economic rights enjoyed by preferred stockholders (which are discussed in detail in appendix B, paragraphs B.07.16–.07.24):

a. Voting rights
b. Protective provisions and veto rights
c. Board composition rights
d. Drag-along rights

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3 Economic rights may also allow investors to influence negotiations regarding future financing, while non-economic rights may also allow investors to protect the economics of their investment. For purposes of this discussion, economic rights have been classified as those that are typically explicitly included in the valuation analysis, and non-economic rights as those that would be considered in estimating the expected time horizon for the investment and determining who would have influence over the portfolio company’s strategy and direction.

4 Drag-along rights should not be confused with tag-along rights, which have different meanings in various other contexts. (See appendix B, paragraphs B.07.01–.07.24, "Rights Associated With Preferred Stock," and the glossary for definitions.)
e. Right to participate in future rounds
f. First refusal rights
g. Tag-along rights
h. Management rights
i. Information rights

8.12 Non-economic rights allow preferred stockholders to influence the manner in which a portfolio company governs itself and manages its operating and financial affairs, irrespective of those stockholders’ proportional ownership interests. For example, preferred stockholders may own 30 percent of the outstanding voting capital stock, but non-economic rights could allow them to influence the portfolio company’s operations as if they owned a majority of the outstanding voting capital stock. Non-economic rights generally lapse at the time of an IPO as the preferred stock is converted into common stock.

8.13 The following tables summarize the nature of the rights typically held by preferred stockholders, whether such rights are generally considered meaningful and substantive in the context of valuing privately held company equity interests, and whether methods for valuing equity interests typically consider such rights (see appendix B, paragraphs B.07.01–07.24, “Rights Associated With Preferred Stock,” for additional details):

Table 8-1

<table>
<thead>
<tr>
<th>Nature of right</th>
<th>Is the right meaningful and substantive?</th>
<th>Purpose of right</th>
<th>When, if ever, is the right generally meaningful and substantive before initial public offering (IPO)?</th>
<th>Is the value of the right readily and objectively measurable?</th>
<th>Do valuation methods typically consider the right?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred dividends (noncumulative)</td>
<td>No</td>
<td>Preference to receive dividends if declared</td>
<td>N/A¹</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Preferred dividends (cumulative)</td>
<td>Yes</td>
<td>Aims to provide a minimum fixed return in all situations except IPO</td>
<td>Entire life of instrument</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Liquidation preference (nonparticipating)</td>
<td>Yes</td>
<td>Ensures higher return up until break-even</td>
<td>Up until break-even point³</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Nature of right</td>
<td>Is the right meaningful and substantive?</td>
<td>Purpose of right</td>
<td>When, if ever, is the right generally meaningful and substantive before initial public offering (IPO)?</td>
<td>Is the value of the right readily and objectively measurable?</td>
<td>Do valuation methods typically consider the right?</td>
</tr>
<tr>
<td>--------------------------</td>
<td>------------------------------------------</td>
<td>----------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>Liquidation preference (participating)</td>
<td>Yes</td>
<td>Ensures disproportionately higher return in all situations except IPO</td>
<td>Entire life of instrument</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Mandatory redemption</td>
<td>Yes(^2)</td>
<td>Right to return of capital; aims to provide liquidity</td>
<td>Entire life of instrument</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Conversion (fixed or variable ratio)</td>
<td>Yes</td>
<td>Produces better economic results in certain circumstances</td>
<td>Entire life of instrument</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Participation (fixed or variable ratio)</td>
<td>Yes</td>
<td>Ensures disproportionately higher return in all situations except IPO</td>
<td>Entire life of instrument</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Antidilution</td>
<td>Yes</td>
<td>Aims to protect value of investment</td>
<td>Entire life of instrument</td>
<td>Maybe(^3)</td>
<td>No</td>
</tr>
<tr>
<td>Registration</td>
<td>No(^6)</td>
<td>Aims to provide liquidity</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

1. Noncumulative preferred dividends are payable only if declared. Because it is unusual for private companies to declare dividends, these rights are considered nonsubstantive until the company considers actually declaring a dividend. Cumulative preferred dividends are payable regardless of whether declared and, thus, increase the liquidation preference for the preferred and are considered substantive.

2. Break-even point refers to the value of the proceeds resulting from an assumed enterprise liquidation for which conversion of preferred to common stock would result in proceeds for preferred shareholders equal to their liquidation preference.


4. Mandatory redemption provisions provide investors with a mechanism for influencing the timing of a liquidity event or other negotiated exit strategy, even in situations where the investors in the respective class of equity do not have control over the enterprise as a whole.

5. Antidilution provisions (for example, down-round protection features) increase the value of preferred stock and preferred or common warrants by increasing the conversion ratio or decreasing the warrant strike price if shares are issued at a lower price at a future date. For the valuation of these instruments, if the company expects to raise one or more future financings that may trigger the provision, the provision should be taken into account in a simulation model (or a lattice if only one financing is expected). If the company expects to reach a liquidity event without needing any additional financing, a simulation would not be required. A scenario analysis that focuses on only a few specific outcomes, rather than considering the distribution of outcomes in one or more scenarios, is generally not an appropriate method for valuing a warrant because it does not provide enough granularity in the future scenarios. The guidance regarding the accounting for such instruments for issuers is complex and subject to change. For investment companies that report under FASB ASC 946, as considered within the scope of this guide, the portfolio company accounting typically is not relevant, as market participants would consider the fair
value of each unit of account for their schedule of investments rather than considering the balance sheet classification at the portfolio company.

6 Typically, private enterprises go public when they are operationally ready, and when market conditions are conducive to a successful initial public offering (IPO). It is not typical for a private enterprise to go public as a result of the preferred stockholders exercising their rights to force the enterprise to file a registration statement for an IPO.

### Table 8-2

<table>
<thead>
<tr>
<th>Nature of right</th>
<th>Is the right meaningful and substantive?</th>
<th>Purpose of right</th>
<th>When, if ever, is the right generally meaningful and substantive before initial public offering (IPO)?</th>
<th>Is the value of the right readily and objectively measurable?</th>
<th>Do valuation methods typically consider the right?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voting</td>
<td>Yes</td>
<td>Ability to control or influence</td>
<td>Entire life of instrument</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Protective provisions and veto rights</td>
<td>Yes</td>
<td>Ability to influence disproportionate to ownership</td>
<td>Entire life of instrument</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Board composition</td>
<td>Yes</td>
<td>Ability to influence disproportionate to ownership</td>
<td>Entire life of instrument</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Drag along</td>
<td>Yes</td>
<td>Ability to require other shareholders to participate in any sale of the investment</td>
<td>Entire life of instrument</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Right to participate in future rounds</td>
<td>Yes</td>
<td>Ability to maintain ownership percentage</td>
<td>Entire life of instrument</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>First refusal</td>
<td>Yes</td>
<td>Restricted ability to sell shares</td>
<td>Entire life of instrument</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Tag along</td>
<td>Yes</td>
<td>Improved ability to sell shares</td>
<td>Entire life of instrument</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Management</td>
<td>Yes</td>
<td>Access to inside information not available to</td>
<td>Entire life of instrument</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
Methods of Estimating the Fair Value of Multiple Classes of Equity

8.14 This chapter discusses four methods for valuing multiple classes of equity used in practice as observed by the task force. Other methods also may exist or be developed in the future.

Overall Comments Applicable to All Four Methods for Valuing Equity Interests

8.15 No single method for valuing equity interests appears to be superior in all respects and circumstances over the others. Each method has merits and challenges, and there are trade-offs in selecting one method instead of the others. The level of complexity differs from one method to another.

8.16 Some methods for valuing equity interests may appear to have more theoretical merit than others. However, such methods typically are more complex, and often, it may be difficult to corroborate estimates of certain critical inputs. A more complex or detailed method would not necessarily be superior to a simpler method that captures the key characteristics that market participants would consider. In addition, there appears to be no method available that takes into account all rights of preferred stockholders. Rather, due to the nature and complexity of some of the typical preferred stock rights, the effect of only certain of the various preferred stock rights is considered under the available methods. That most of these rights typically do not appear in conjunction with securities issued by publicly traded enterprises contributes to the absence of market comparables for funds to draw upon. The resulting challenges in estimating fair value do not, however, justify the use of "rules of thumb."
8.17 Non-economic rights such as voting rights, protective provisions, and veto rights, board composition rights, drag-along rights, first refusal rights and tag-along rights, management rights, and information rights are generally not explicitly considered in any of the commonly used methods for valuing equity interests. However, these rights would be considered in assessing market participant expectations regarding expected exit scenarios and the timing of exit. In addition, the impact of these rights may be captured in adjustments applied to the modeled value for the preferred stock after estimating the value of the equity interests consistent with the investors’ required rate of return5 using one of the methods described subsequently. See chapter 9, "Control and Marketability," for a discussion of these adjustments.

Considerations Affecting the Selection of a Method for Valuing Equity Interests in Complex Capital Structures

8.18 FASB ASC 820 does not describe any specific techniques that are required for estimating the fair value of equity interests in complex capital structures. The following sections describe four possible methods for valuing equity interests:

- scenario-based methods, a forward-looking method that considers one or more possible future scenarios. These methods include simplified scenario analysis and relative value scenario analysis, which tie to the fully-diluted (“post-money”) equity value, as well as full scenario analysis, also known as the probability-weighted expected return method (PWERM);

- the option pricing method (OPM), a forward-looking method that considers the current equity value and then allocates that value to the various classes of equity considering a continuous distribution of outcomes, rather than focusing on distinct future scenarios;

- the current value method (CVM), which allocates the equity value to the various equity interests in a business as though the business were to be sold on the measurement date; and

- the hybrid method, a hybrid of scenario-based methods and OPM.

Most of these methods are illustrated by case studies in appendix C, "Valuation Case Studies," especially in case study 9, Biotech Investment with a Complex Capital Structure – Multiple Investors’ Perspectives, which shows how several funds approached valuation of their investments in an early-stage biotech company. Other methods may be used, but these four methods have been commonly used in practice. Sometimes, more than one method is used, and the results of one method may be used for purposes of corroborating the results of another. It would be appropriate for the fund to use judgment in selecting a reasonable methodology under the circumstances, considering the nature of the portfolio

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5 As discussed in paragraph 7.02, most privately held companies have investors who in aggregate have control of the portfolio company. When valuing the minority instruments within a portfolio company, it is appropriate to consider these investors’ required rate of return.
company and the characteristics of the specific equity interests, as further described in the next paragraph.

8.19 The task force recommends that in selecting a method for valuing equity interests, the following criteria be considered:

   a. The method reflects the going-concern status of the portfolio company. The method reflects that the value of each class of instruments results from the expectations that market participants investing in those instruments would make about future economic events and the amounts, timing, and uncertainty of future cash flows to be received by the holders of each instrument.

   b. The method assigns some value to the junior instruments, unless the portfolio company is being liquidated and no cash is being distributed to the junior instruments.

   c. The results of the method can be either independently replicated or approximated by other valuation specialists using the same underlying data and assumptions. The method does not rely so heavily on proprietary practices and procedures that assurance about its quality and reliability cannot be readily and independently obtained.

   d. The complexity of the method is appropriate to the portfolio company’s stage of development. Consider, for example, a start-up company with few or no full-time employees and in the early stages of development. A highly complex full scenario analysis performed at high cost may not be appropriate for such a portfolio company. The assumptions underlying that valuation could be highly speculative, and the variability in the valuation may be correspondingly high. A simplified scenario analysis, relative value scenario analysis or option pricing model, with the simpler set of assumptions required for these methods, may give equally reasonable results at a lower cost.

Scenario-Based Methods

8.20 Scenario-based methods are forward-looking methods that consider the payoff to each class of equity across a range of future exit scenarios, discounted to the measurement date at an appropriate rate of return for that class. Scenario-based methods can be relatively simple or extremely complex, depending on the number and complexity of the scenarios required to capture the differences in value between the various classes of equity. For the purposes of this discussion, three types of scenario-based methods are considered: simplified scenario analysis, relative value scenario analysis, and full scenario analysis.

Simplified Scenario Analysis

8.21 Under a simplified scenario analysis, the value of the various equity interests are estimated based on their pro-rata share of the “post-money” value for the company, considering the maximum number of common-stock equivalents that would be required to be issued if all outstanding classes of equity in the current capital structure were
converted. That is, the post-money value models each class of equity on an as-converted basis, and then multiplies by the common-stock-equivalent price, updated for each measurement date considering the changes in the company and changes in the markets as described in paragraph 8.23. The pro-rata share of the post-money value is also known as the fully-diluted value of equity.

8.22 The simplified scenario analysis approach may be appropriate if the distribution of outcomes for the portfolio company is expected to be bimodal with no value on the downside; that is, if the portfolio company is either expected to succeed, exiting at a value that is high enough that all classes of equity will convert, or fail, exiting at a low value that would provide no payoff to the existing classes of preferred. This approach may also be appropriate if market participants would assume that it is highly likely that the preferred stock would convert, which may be the case for companies that are expected to exit via an IPO or where the later rounds have additional preferences but the earlier rounds have control over the timing of exit. In these situations, the liquidation preferences for the preferred stock would be expected to have no impact on the ultimate payoff realized, and thus, the future payoffs would be consistent with a fully-diluted approach for measuring the value of the equity interests on the measurement date.

8.23 The post-money value used as an input to a simplified scenario analysis would be calibrated to the latest financing round and then updated for each measurement date considering the changes in the company and the changes in the markets, evaluating the changes in the expected future exit value in the “success” scenario and on market participants’ required rate of return for the equity interests. A useful check in estimating the post-money value is to consider what price the investors would be willing to pay if the company were to raise an additional round of financing on the measurement date. See appendix C, case study 10, Early Stage Software as a Service Startup with Binary Expected Outcomes, paragraphs C.10.26–29, for an example of this approach.

Relative Value Scenario Analysis

8.24 Under a relative value scenario analysis, the value of the various equity interests are estimated based on their pro-rata share of the post-money value for the company calibrated to the most recent round, considering the common stock equivalents, and then adjusted to consider the differences in expected cash flows and difference in risk for the earlier rounds of financing.

8.25 For example, if the portfolio company has just raised a series D round of financing that has seniority over prior rounds, the fund might estimate that there is a 30% chance of success where all classes of equity convert, a 40% chance of a mid-value exit where the series D would receive an expected value of 70% of its liquidation preference but earlier rounds would receive no payoff, and a 30% chance of dissolution where neither the series D nor the earlier rounds would receive any return. The payoff to the earlier rounds would

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6 Please see Q&A 14.54, Value of Liquidation Preferences, for a discussion of the reasons why the liquidation preferences for early rounds of financing are unlikely to receive a direct economic payoff. Please see Q&A 14.52, Use of the Option Pricing Method, for a discussion of the implications for the valuation of the investments and the related common stock considered in valuing management interests when using the Option Pricing Method.
thus be lower than the series D price by 28% (40% times 70%) of the series D liquidation preference. If the Series D price was $3 and there were 50 million common-stock equivalents outstanding, the post-money value would be $150 million, and the fair value of the Series A, B and C would be estimated at $2.16 per share.

8.26 The relative value scenario analysis approach may use whatever scenario structures and probabilities are appropriate given the facts and circumstances: for example, scenarios where the latest round receives its full liquidation preference and the earlier rounds receive a portion of their liquidation preferences, or where the latest round receives its liquidation preference and earlier rounds convert, and so on. In assessing the differences between the classes of equity, this approach would typically ignore discounting, treating the differences as reflecting the present value of the relative payoffs.

8.27 The post-money value used as an input to this analysis would be calibrated to the most recent round of financing considering the range of future exit scenarios, and then updated for each measurement date considering the changes in the company and in the markets, evaluating the changes in the expected future exit values in all success and mid-value exit scenarios and on market participants’ required rate of return for the equity interests. See appendix C, case study 9, Biotech Investment with a Complex Capital Structure – Multiple Investors’ Perspectives, for an example of this approach (illustrated specifically in paragraphs C.09.53–.54 and C.09.74), as well as a comparison with other valuation approaches.

8.28 For example, referring back to paragraph 8.25, suppose at the next measurement date, the portfolio company has performed well and the fund estimates that the updated post-money value has increased to $200 million. This post-money value would indicate that the fair value of the Series D has increased to $4 per share. The fund also estimates that the probability of success has increased to 40% and the probability of a middle value exit where Series D receives an expected value of 70% of its liquidation preference has decreased to 30%, so the earlier rounds would be priced at a 21% discount to the Series D. The fair value of the Series A, B and C thus would be estimated at $3.16 per share.

Full Scenario Analysis

8.29 Under a full scenario analysis, the value of the various equity interests are estimated based upon an analysis of future values for the portfolio company, assuming various future outcomes. Share value is based upon the probability-weighted present value of expected future investment returns, considering each of the possible future outcomes available to the portfolio company, as well as the rights of each share class. Although the future outcomes considered in any given valuation model will vary based upon the portfolio company’s facts and circumstances, common future outcomes modeled might include an IPO, a merger or sale, a dissolution, or continued operation as a private company until a later exit date. The future exit scenarios and required rate of return would be calibrated to the most recent round of financing, considering expected dilution.

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7 As discussed in paragraph 8.07, almost all venture capital-backed and private equity-backed companies will ultimately seek liquidity through an initial public offering (IPO) or sale of the company; thus, it is typically not appropriate to model a scenario in which such a company remains private indefinitely.
from future financings. The required rate of return for other classes of equity would be assessed considering the relative risk of each class.

8.30 This method involves a forward-looking analysis of the potential future outcomes available to the portfolio company, the estimation of ranges of future and present value under each outcome, and the application of a probability factor to each outcome as of the valuation date, consistent with market participant assumptions. The following list is a simple overview of how this method may be applied. The specific construct of the model and the assumptions used will depend on the facts and circumstances surrounding the portfolio company.

a. Determine the possible future outcomes available to the portfolio company. First, the fund needs to determine the range of possible future exit scenarios for the portfolio company (for example, IPO, merger or sale, dissolution, or continued operation as a private portfolio company until a later exit date).

b. Estimate the future equity value under each outcome, either as a point estimate or range. The future pre-money value of the portfolio company is estimated at the date of each possible future outcome. A simple application might use a single value and date for each outcome, whereas a more complex application might use a range of values and dates for each outcome. At a minimum, the range of outcomes considered should include both high and low values (for example, a high-value strategic sale and a low-value sale of assets). If the range of possible future values considered is too narrow, the scenario analysis will not fully capture the value of the downside protection and the value differences driven by differences in seniority and liquidation preferences for the preferred stock. In some cases, it may be appropriate to consider a hybrid approach with a probabilistic distribution of values for a given scenario. For example, if the company is considering a near-term IPO, but the IPO might also be deferred, and the company is unsure what exit value it might achieve, it might be reasonable to use specific details for the IPO scenario and a lognormal distribution of future values (such as in the OPM) in the postponed exit scenario, consistent with market participant assumptions. This hybrid approach would also be appropriate in the situation in which the company has a number of possible near-term exits that can be modeled explicitly, but it may also remain private for an extended period of time and does not have good insight into the distribution of outcomes if the exit is delayed (the private company scenario). See the discussion of the hybrid method in paragraphs 8.60–.66.

c. Allocate the estimated future equity value to each share class under each possible outcome. Within each scenario, the future values are then allocated to the various shareholder classes based upon the rights afforded each class, assuming each class of shareholder will seek to maximize its value. For example, at value levels when preferred shareholders would maximize their return by converting to common stock, conversion is assumed. Conversely, at value levels when return would be maximized by exercising a liquidation preference, such exercise is assumed. The allocation should also include the dilution impacts of any additional required
financings for each scenario and any options and warrants that may be exercised, when exercise should be assumed for a given scenario (with the resulting proceeds added to the equity value) if exercising the options and warrants would be optimal in that scenario. Companies frequently reserve an option pool that includes the options that may be issued to new and existing employees as the company progresses toward a successful liquidity event. In a full scenario analysis, it is appropriate to include in the allocation the options that will be needed to reach each exit scenario, along with the cash that would be realized from their exercise prices.

d. Weight each possible outcome by its respective probability to estimate the expected future probability-weighted cash flows to each share class. Probabilities are assigned to each of the possible future outcomes. If desired, the valuation model may include various sub-scenarios within each outcome, each with its own probability, or it may use a probability distribution to model a range within each outcome.

e. Discount the expected equity value allocated to each share class to present value using a risk-adjusted discount rate. The expected shareholder value under each outcome is discounted back to the valuation date using appropriate discount rates. The fund should consider whether different discount rates should be used for each shareholder class, considering the relative risk of each class. The discount rates would typically be calibrated to the most recent round of financing so that the selected probabilities and discount rates are internally consistent.\(^8\)

\[\text{PV} = \frac{E}{(1 + r)^t}\]

f. Divide the present value allocated to each share class by the respective number of shares outstanding to calculate the value per share for each class. The per-share value of each class of shares, including the common stock, is then calculated. A good check is to compare the share price of the latest round of preferred financing with the value implied for that share class by the model to assess whether the assumption set used is reasonable in light of that actual financing transaction.

g. Consider additional adjustments. The fund should consider whether any additional discounts are appropriate (for example, discounts for illiquidity or lack of marketability). See chapter 9, “Control and Marketability,” for a discussion of these adjustments.

\(^8\) The discount rate for the common stock and junior preferred may take into consideration the leverage imposed by the debt, as well as the liquidation preferences senior to each class. The weighted average discount rate across all the classes of equity should equal the company’s cost of equity. This approach is a form of method 2 of the expected present value technique discussed in paragraph 5.61.

Note that in some circumstances, the scenarios modeled in a full scenario analysis incorporate a different level of company-specific risk. For example, the IPO scenario may be modeled using aggressive banker projections, but the sale or later exit scenarios may be modeled using more conservative internal projections. In these situations, it may be appropriate to include an additional risk premium within specific scenarios and to estimate the conditional present value for each instrument before estimating the probability-weighted average. Even in these situations, however, it is important to keep in mind that the selected discount rate for each instrument should reflect the overall required rate of return to the expected cash flows for that instrument (that is, a portfolio rate of return).
Additional Considerations

8.31 Although scenario-based methods focus on the future exit values and their allocation to each class of equity, it is also important to consider the interim cashflows.

□ Typically, a simplified scenario analysis or relative-value scenario analysis is calibrated to the most recent transaction date, and then updated to reflect the changes in the post-money value through the measurement date. If the post-money value considering common-stock equivalents is estimated by considering a future exit value, then these methods should incorporate an estimate of the dilution from future rounds of financing required to reach that exit.

□ Typically, a full scenario analysis approach is used when the company is close to exit and does not plan on raising additional capital. In this case, the interim cash flows would be funded out of existing cash, and the cash considered at the liquidity event would be the expected residual cash. If additional financing is needed to reach the modeled exit scenarios, the capital structure used in the full scenario analysis allocation should include both the future payoff amount for the debt (calibrated so that the expected value across all the scenarios equals today’s fair value), as well as any future rounds of financing the company will need in order to reach that future exit. Because the details of these future financings are not known until the time to a liquidity event is short, the use of a full scenario analysis for companies that still need more than one additional round of financing can be challenging.

Estimated dilution would be incorporated as discussed in paragraphs 13.65–.76, “Dilution.”

8.32 Scenario-based methods focus on either (a) the current post-money value, or (b) a range of future exit values allocated to the various equity interests and then discounted to the measurement date. When possible, a best practice is to reconcile the probability-weighted present values of the future exit values to the overall equity value for the portfolio company estimated as discussed in paragraphs 7.03–.07, to make sure that the overall valuation of the portfolio company is reasonable. In a full scenario analysis, calibration may be used to infer the equity value implied by a recent financing transaction by considering the future outcomes available to the portfolio company as described previously, and then estimating the future exit values, the probabilities for each scenario, and the discount rates for the various equity interests such that value for the most recent financing equals the amount paid. Care should be taken to avoid unrealistic assumptions regarding the return to the preferred in the dissolution or low-value sale scenarios. Higher returns to the senior classes of equity in the dissolution or low-value sale scenarios should be supported with evidence that the portfolio company would have

9 Venture capital data indicates that the average return to the investors in exits when the investor interests receive a return less than or equal to their original investment is between 15 percent and 25 percent of invested capital, depending on the round of the investment, and that the investors receive no value in approximately 35 percent to 45 percent of these exits. Therefore, when reconciling to a recent financing round in a scenario-based framework, the upside scenarios must have a high enough return to offset these downside scenarios. See, for example, Andrew Metrick, Venture Capital and the Finance of Innovation (Hoboken, NJ: John Wiley & Sons, Inc., 2007).
assets that would be saleable or distributable to shareholders upon dissolution even if
cash is exhausted, and current development plans are not successful.

8.33 The primary virtues of scenario-based methods are their conceptual merit and alignment
with the way that market participants consider these investments. These methods
explicitly consider the various terms of the shareholder agreements, including various
rights of each share class, at the date in the future that those rights will either be executed
or abandoned. Scenario-based methods are forward looking and incorporate expectations
about future economic events and outcomes into the estimate of value as of the present.
Scenario-based methods are not simply a static allocation among shareholders of a single
estimate of the portfolio company’s value as of the present. Finally, if the scenarios are
constructed using rational expectations and realistic assumptions and calibrated to any
recent transactions, the relative equity values for each class of equity that result from
these methods are typically not overly sensitive to changes in the probability estimates,
except when one of the possible outcomes is assigned a very high probability. Therefore,
as long as the model can be calibrated, it is not essential that the assumptions used in the
analysis perfectly reflect future outcomes for the business (which would be impossible
anyway, given the high uncertainty associated with most private-equity and venture
capital-backed companies), but rather, that the assumptions are internally consistent and
reflect the fund’s best estimate of market participant assumptions.

8.34 The primary limitation of scenario-based methods, especially full scenario analysis, is
that they can be complex to implement and require detailed assumptions about potential
future outcomes. Estimates of the probabilities of occurrence of different events, the dates
at which the events will occur, and the values of the portfolio company under and at the
date of each event may be difficult to support objectively. The methods may involve
complex construction of probability models and might depend heavily on subjective
management assumptions. To the extent possible, calibration should be used to mitigate
these issues.

8.35 In short, the attributes of scenario-based methods make them conceptually attractive, but
they may be challenging to implement, and the values they produce could be difficult to
support using other means. In addition, because scenario-based methods typically
consider only a specific set of discrete outcomes, rather than the full distribution of
possible outcomes, these methods are not appropriate for valuing option-like payoffs,
such as common stock options, profits interests, or warrants. Instead, an OPM or hybrid
method should be used for valuing these instruments.

8.36 Because future outcomes need to be explicitly modeled, full scenario analysis is generally
more appropriate to use when the time to a liquidity event is short, making the range of
possible future outcomes relatively easy to predict. For earlier-stage companies, it is
possible to use a simplified scenario analysis or relative value scenario analysis, or a
variant of these approaches that focuses on the exit values on a per-share basis relative to

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Note that a hybrid model that uses an option pricing framework within each exit scenario or a simulation model
might be used to take into account the variability of each of these inputs. This approach provides advantages of the
scenario-based framework while still capturing a full distribution of outcomes. See paragraphs 8.60–66.
the latest financing round (for example, considering the probabilities of achieving no return, less than 1 times the return, up to 1.5 times the return, up to 2 times the return, 2–5 times the return, 5–10 times the return, and 10 times the return or more). Data on the distribution of exit multiples for early-stage ventures by round of financing is available.\textsuperscript{11} Another approach that is appropriate for earlier-stage companies is a hybrid method that considers the expected equity value in various scenarios but that uses OPM to allocate the value within each of those scenarios. See paragraphs 8.60–.66.

The OPM

8.37 The OPM is an allocation method that considers the current value of equity and then allocates that equity value to the various interests considering their rights and preferences. The OPM treats common stock and preferred stock as call options on the portfolio company’s equity value, with exercise prices based on the liquidation preferences of the preferred stock. Under this method, the common stock has value only if the funds available for distribution to shareholders exceed the value of the liquidation preferences at the time of a liquidity event (for example, a merger or sale), assuming the portfolio company has funds available to make a liquidation preference meaningful and collectible by the shareholders. The common stock is modeled as a call option that gives its owner the right, but not the obligation, to buy the underlying equity value at a predetermined or exercise price. In the model, the exercise price is based on a comparison with the equity value rather than, as in the case of a "regular" call option, a comparison with a per-share stock price. Thus, common stock is considered to be a call option with a claim on the equity at an exercise price equal to the remaining value immediately after the preferred stock is liquidated. The OPM has commonly used the Black-Scholes model to price the call option.\textsuperscript{12}

8.38 The OPM considers the various terms of the stockholder agreements that would affect the distributions to each class of equity upon a liquidity event, including the level of seniority among the classes of equity, dividend policy, conversion ratios, and cash allocations. In addition, the method implicitly considers the effect of the liquidation preference as of the future liquidation date, not as of the valuation date.

8.39 One of the critical inputs into the OPM is the total equity value for the portfolio company. As discussed in chapter 7, “Valuation of Equity Interests in Simple Capital Structures,” this total equity value should be measured considering the cash flows under current ownership and the investors’ required rate of return. This basis of valuation

\textsuperscript{11} Ibid. Care should be taken that the distribution of returns captures the full range of downside and upside scenarios and that the preferred stock value implied from the model reconciles to the recent round of financing.

\textsuperscript{12} Option valuation methodologies are constantly evolving, and readers should be alert to which methodologies are considered preferable to others under various sets of facts and circumstances. Examples of option valuation methodologies that differ conceptually from the Black-Scholes model include path-dependent or lattice models, including simulation or binomial models. These types of approaches are used when valuing instruments whose value depends on the evolution of the value of the company at interim periods (for example, instruments with antidilution provisions or down-round protection).

provides an indication of value for the equity interests that considers the degree of control and marketability for the interests held by the investors who in aggregate have control of the business, providing a consistent basis for comparison with the liquidation preferences for the preferred stock. Because the liquidation preferences for the preferred stock provide a threshold level of return for the investors before the common stock begins participating, option pricing models that treat the liquidation preferences as a strike price should take as their input the enterprise value that is consistent with the investors’ required rate of return.

8.40 In an OPM framework, calibration may be used to infer the equity value implied by a recent financing transaction by making assumptions for the expected time to liquidity, volatility, and risk-free rate and then solving for the value of equity such that value for the most recent financing equals the amount paid. This method is most appropriate when the financing transaction is an arm’s-length transaction and pari passu with previous rounds. If the transaction is distressed, has seniority over prior rounds, or lacks the information rights and control features that investors typically expect, it may be appropriate to make adjustments to the price prior to calibrating. See paragraphs 8.42–.45 for a discussion of the issues with calibrating to senior rounds of financing using the OPM, and paragraph 10.31, “Inferring Value From Transactions in a Portfolio Company’s Instruments,” for a discussion of various types of transactions that may be considered in inferring the equity value and the value of related equity interests in a portfolio company.

8.41 Note that the equity value used in an OPM framework will typically be significantly lower than the post-money equity value, since the OPM framework considers the full value of the downside protection associated with the preferred stocks’ liquidation preferences using a lognormal distribution, whereas the post-money value calculation assumes that all equity interests in the capital structure have the same pro rata value. Either the OPM calibration approach or post-money approach may be used for estimating the enterprise value to be used as an input for estimating the fair value of the interests in the enterprise, depending on the facts and circumstances, provided that the methodology used for estimating the enterprise value and the methodology used for allocating the enterprise value are internally consistent. Using a post-money value and allocating it using an OPM, or vice versa, will yield nonsensical results. If the liquidation preferences for the equity interests would not be relevant to market participants’ transaction decisions at the measurement date, then an OPM would be less appropriate than a scenario-based method. Please see paragraphs 8.20–.36 for a discussion of scenario-based methods for estimating the fair value of the equity interests in the enterprise using the post-money equity value as an input.

8.42 The OPM was designed to model option-like payoffs such as common stock, capturing the value of the potential upside for an asset above a specified threshold. It also is an appropriate method for estimating the value of a highly-levered debt or debt-like

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13 The expected time to liquidity is the probability-weighted average time to liquidity across all future exit scenarios and represents the expected time over which the enterprise value may evolve before the payoffs to the various classes of equity are resolved.
preferred instrument, where the debt-like instrument receives a specified payoff when the asset value exceeds that payoff, or the debt-like instrument receives the asset if the asset value is not high enough to meet the specified payoff. In this case, the value of the debt-like instrument can be measured as the total value of the assets less the value of the upside option. However, the OPM and other structured models that estimate the payoff to the various classes of equity following the strict contractual terms of the waterfall are not ideal for estimating the relative value of senior and junior preferred classes.

8.43 The issue with modeling senior and junior preferred classes within the OPM is that the liquidation preference for the junior preferred class is "sandwiched" between the senior preferred and the common stock. On the downside, only the senior preferred is protected. On the upside, the junior preferred liquidation preference receives only the specified payoff, while the common receives any additional growth in value. This issue is illustrated in the following payoff diagram:

![Payoff Diagram](image)

8.44 In practice, the investors in the preferred stock have influence over the portfolio company’s operations and the timing of exit. Rather than blindly allowing the value of the company to evolve through a predetermined exit date, as is assumed in OPM, the investors would typically manage through downturns, perhaps taking the opportunity to invest more capital or buy out senior equity interests at a low valuation. Furthermore, in a low value sale exit or bankruptcy scenario, even though each tier of seniority has its own interests that may be at odds with the other tiers, all the investors have an incentive to negotiate to achieve the best exit possible – the longer the portfolio company languishes before finding a buyer, the lower the value that will be realized. Since the size of the pie is not static, the holders of the senior preferred may maximize their return by offering to
share value with the junior preferred, rather than insisting on strictly following the waterfall. OPM does not model any of these dynamics.

8.45 For funds that choose to use OPM to value investments in portfolio companies where the preferred classes of equity have different levels of seniority, the task force recommends considering carefully which class or classes of equity in aggregate have control of the timing of exit and decisions regarding future financing rounds, and assessing the company’s strategies and the extent to which the liquidation preferences will impact the value that may be realized for each class of equity at the liquidity event. Given these factors, several variants of the OPM may be considered to better model the relative values of the senior and junior preferred classes:

- If the portfolio company will need additional financing in order to reach a successful exit and would have no value on the downside, then it may be appropriate to ignore the contractual differences in seniority and model the liquidation preferences as pari passu, since any new financing would be likely to be senior to all of the outstanding classes of equity.

- The fund could also perform a valuation of the total equity as of the most recent financing date based on other methods, and then apply a calibration discount to the senior classes of equity to capture the difference between the model values and the transaction price. This calibration discount would then be carried forward for future measurement dates, continuing to use the same calibrated framework as long as market participants would use that same framework. The calibrated discount would be adjusted over time, considering any changes in facts and circumstances, including factors such as any changes in the capital structure or changes as the company approaches a liquidity event.

- Another approach would be for the fund to use a simulation analysis that includes any additional financing needed and captures the likely characteristics of that financing depending on the evolution of the value of the portfolio company. The simulation approach can also be used to model the investors’ ability to choose the timing of exit depending on the evolution in value of the company.

- Yet another alternative would be for the fund to use a hybrid method as described in paragraphs 8.60–.66, considering the expected value of the portfolio company under various scenarios, including any additional financing needed, and then modeling the allocation to the senior and junior preferred classes within each scenario using the OPM framework.

It is important to consider the facts and circumstances in estimating the fair value of each position.

8.46 Unlike scenario-based approaches that explicitly estimate future exits, the OPM begins with the current equity value and estimates the future distribution of outcomes using a lognormal distribution around that current value. Therefore, the OPM should incorporate the interim cash flows in the estimate of that initial equity or enterprise value. For
example, in a discounted cash flow analysis, the cash flows in each period would reflect the revenues and costs in that period. For early-stage companies, these cash flows are typically negative for several periods, reflecting the company’s investments in growth.

8.47 In general, because the OPM considers the evolution of the equity value without allowing for proceeds raised in additional financings, the allocation does not include the dilution impacts of any additional financings nor the offsetting cash raised, nor the dilution impacts of any options and warrants that may be issued as the company progresses toward a future liquidity event. That is, even if the company has reserved a pool of options that may be issued to new and existing employees as the company progresses toward a successful liquidity event, only outstanding options and options that will be issued in the short term, irrespective of any changes in the company’s value, are included in the allocation.\(^{14}\) The total equity value used in the allocation typically would consider the current invested capital and current outstanding shares, rather than considering the full range of value that might be realized at the liquidity event and the additional financings and additional shares that would be required to achieve that range of exits. Please see paragraphs 13.65–.76, for additional discussion of the dilution impacts of future financing rounds.

8.48 The primary limitation of the OPM is that it assumes that future outcomes can be modeled using a lognormal distribution and that it is sensitive to certain key assumptions, such as the volatility assumption (one of the required inputs under the Black-Scholes model), that are not readily subject to contemporaneous or subsequent validation. Additionally, the lack of trading history for privately held portfolio companies makes the subjectivity of the volatility assumption a potential limitation on the effectiveness of the method to estimate fair value. Key issues to consider in estimating the volatility are as follows:

a. For early-stage companies, it is likely that the guideline public companies will be larger, more profitable, and more diversified; thus, the appropriate volatility may be best represented by the higher end of the range of the guideline public companies, especially for shorter time frames, migrating toward the median of small public companies over the longer term. If no direct competitors are small, high-growth companies, consider using a set of smaller companies from the broader industry to estimate the volatility.

b. For later-stage privately held companies, consideration should be given to the effect of the company’s leverage. Although many early-stage firms have limited, if any, debt, later-stage firms or those acquired in a leveraged buy-out may have significant debt financing, the effect of which can be to significantly increase the volatility of the firm’s equity. For example, in a company with 75 percent debt, if the value of the company doubles, the value of equity increases by a factor of 5. The general relationship between equity value and asset value can be expressed as follows:

\[ \text{Equity Value} = \text{Asset Value} \times (1 + \text{Volatility}) \]

\(^{14}\) More sophisticated lattice or simulation models that consider future financings and option issuances as a function of the change in value of the company over time are also feasible; however, the assumptions regarding the terms and conditions of future financing rounds may be speculative and difficult to estimate.
Equity Value = Total Asset Value × N(d1) – Book Value of Debt × exp(–rT) × N(d2)

In this equation, r is the risk-free rate, T is the time to liquidity, and d1 and d2 have their standard Black-Scholes definitions based on the asset’s volatility. In addition, the relationship between equity volatility and asset volatility can be written as follows:

Equity Volatility = (Total Asset Value × N(d1) × Asset Volatility) / Total Equity Value

In a highly levered company, it is possible to solve for an asset volatility and equity volatility that satisfy both equations by treating the total asset value as the implied value of assets, given the company’s leverage. This approach results in estimates of asset volatility that are internally consistent and better match market data. ¹⁵

c. An alternative approach is to use the portfolio company’s enterprise value as the underlying asset. Under this approach, the zero coupon bond equivalent of the debt¹⁶ is modeled as the first breakpoint, modeling the total equity as a call option on the enterprise value. In this approach, the volatility used should be the asset volatility, which would not be affected by the financial leverage. In theory, these two approaches should result in equivalent values. In some cases, however, the allocation of enterprise value instead of equity value may have the effect of shifting value from the senior classes of equity to the junior classes of equity because the liquidation preference for the senior preferred is “sandwiched” between the debt and junior classes of equity. In practice, rather than allowing the debt holders to claim the full enterprise value as is assumed when allocating enterprise value using the OPM, the controlling investors typically will begin a negotiation process with the debt holders prior to liquidation. Therefore, the task force believes that using the equity value as the underlying asset, considering the value of debt for the purpose of valuing equity, as discussed in paragraphs 6.19–.31, provides a better indication of the relative value of the senior and junior classes of equity.

8.49 It may also be difficult under the OPM to take into account the right and ability of preferred shareholders to control the timing of exit (that is, to sell the portfolio company or take the portfolio company public earlier or later than anticipated), which can change the allocation of value between the senior and junior classes of equity. The potential for

¹⁵ Stanislava M. Nikolova, “The Informational Content and Accuracy of Implied Asset Volatility as a Measure of Total Firm Risk” (research paper, 2003).

¹⁶ The zero coupon bond equivalent of the debt is the future payoff amount for the debt such that the modeled value of the debt (the value allocated to the first breakpoint) equals its fair value. See paragraphs 6.25–.26 and Q&A 14.47, Using the Zero Coupon Bond Equivalent for Including Debt in the Option Pricing Method.
changing the timing of exit depending on the evolution in the equity value is most appropriately modeled using a lattice or simulation model.

8.50 In some cases, it may be appropriate to consider more than one scenario and run the option pricing model within each. For example, if the preferred stock has the right to both its liquidation preference and upside participation in a sale but is forced to convert upon a qualified IPO, it might be necessary to model the sale scenario (with unlimited participation) separately from the IPO scenario (with forced conversion at the qualifying IPO threshold).17 Another example in which this approach can be helpful is when a new financing round is being negotiated, but the price depends on whether the company achieves certain milestones. See the discussion of the hybrid method in paragraphs 8.60–.66.

8.51 After allocating the equity value to the preferred and common stock, the fund should consider whether any additional discounts are appropriate (for example, discounts for illiquidity or lack of marketability). See chapter 9, “Control and Marketability,” for a discussion of these adjustments.

8.52 An advantage of the OPM is that it explicitly recognizes the option-like payoffs of the various share classes, utilizing information about the underlying asset (that is, estimated volatility) and the risk-free rate to adjust for risk by adjusting the probabilities of future payoffs. A disadvantage of the OPM is that it considers only a single liquidity event and, thus, does not fully capture the characteristics of specific potential future liquidity events (for example, IPO or sale) at various time horizons.

8.53 The OPM (or a related hybrid method) is an appropriate method to use when specific future liquidity events are difficult to forecast. That is, the use of the method may be appropriate in situations in which the portfolio company has many choices and options available, and the enterprise’s value will evolve depending on how well it follows an uncharted path through the various possible opportunities and challenges. If the distribution of outcomes is expected to be bimodal (for example, reflecting two outcomes where a technology or product either succeeds or fails), a scenario-based method or hybrid method may be more appropriate.

The CVM

8.54 The Current-Value Method (CVM) of allocation is based on first estimating equity value on a controlling basis, assuming an immediate sale of the portfolio company, and then allocating that value to the various series of preferred stock based on the series’ liquidation preferences or conversion values, whichever would be greater. The CVM is easy to understand and relatively easy to apply, thus making it a method frequently encountered in practice. However, given the way in which market participants realize

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17 Note that the IPO scenario in this example should be thought of as "aim-for IPO" rather than describing an IPO at a specific value. In this scenario, if the fair value of the company increases enough to reach the qualifying IPO threshold, then the preferred stock is forced to convert. If the fair value of the company declines or increases to less than the required threshold, then the model assumes that the company will accept a lower value exit (via a sale or sale of assets rather than an IPO), and the preferred stock will not be forced to convert.
value from investments, the task force believes its use is appropriate mainly in two limited circumstances; see paragraph 8.58. Note that allocating value pro-rata to the various classes of equity based on their as-converted values or common stock equivalents would be reasonable if market participants would assume that the liquidation preferences would have no impact on the ultimate payoffs received. This method would be considered to be a simplified scenario analysis, which is described in paragraphs 8.21–.23.

8.55 The fundamental assumption of this method is that the manner in which each class of preferred stockholders will exercise its rights and achieve its return is estimated based on the enterprise value as of the valuation date, not at some future date. Accordingly, depending upon the enterprise value and the nature and amount of the various liquidation preferences, preferred stockholders will participate in equity value allocation either as preferred stockholders or, if conversion would provide them with better economic results, as common stockholders. Convertible preferred stock that is "out of the money"18 as of the valuation date is assigned a value that takes into consideration its liquidation preference. Convertible preferred stock that is "in the money" is treated as if it had converted to common stock. Common shares are assigned a value equal to their pro rata share of the residual amount (if any) that remains after consideration of the liquidation preference of "out-of-the-money" preferred stock.

8.56 The principal advantage of this method is that it is easy to implement and does not require assumptions about future exits or the use of complex tools. The method assumes that the value of the convertible preferred stock is represented by the most favorable claim the preferred stockholders have on the equity value as of the valuation date.

8.57 However, this method often produces results that are highly sensitive to changes in the underlying assumptions. Another limitation of the method is that it is not forward looking and fails to consider the option-like payoffs of the share classes and, therefore, may not appropriately reflect the way that market participants would realize value from the interest. That is, absent an imminent liquidity event, the method fails to consider the possibility that the value of the portfolio company will increase or decrease between the valuation date and the date at which common stockholders will receive their return on investment, if any.

8.58 Because the CVM focuses on the present and is not forward looking, the task force believes its usefulness is limited primarily to two types of circumstances. The first occurs when a liquidity event in the form of an acquisition or a dissolution of the portfolio company is imminent, and expectations about the future of the portfolio company as a going concern are virtually irrelevant. In this circumstance, the CVM value, adjusted if necessary for the timing and risk associated with the expected transaction, would reflect the fair value of the equity interests. The second occurs when the fund’s position to be measured has seniority over the other classes of equity in the portfolio company and the

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18 Convertible preferred stock is "out of the money" if conversion to common stock would result in a lower value of the holdings of preferred stockholders than exercising the liquidation preference. Conversely, convertible preferred stock is "in the money" if conversion to common stock would result in a higher value of the holdings of preferred stockholders than exercising the liquidation preference.
investors who hold this class of equity have control over the timing of exit. In this case, the investors could sell the portfolio company on the measurement date and their position would realize the allocated value from the CVM (the CVM value). Therefore, the value of the fund’s position cannot be lower than the CVM value. If the fund’s position also has participation or conversion rights that would allow the fund to participate in the upside, the fund may consider if the fair value of the position would exceed the CVM value.

Note that for simple capital structures, it is possible to allocate the enterprise value by directly estimating the value of any debt and debt-like preferred instruments using the yield method, subtracting those values from the total enterprise value, then allocating the residual equity value pro rata to the common stock, as discussed in chapter 7, “Valuation of Equity Interests in Simple Capital Structures.” Unlike the CVM, the yield method is a forward-looking method that estimates the value of the debt and debt-like preferred instruments for the purpose of valuing equity, given the market yield for these instruments over the expected duration, considering the risk of the instruments. This method may also be applicable for valuing participating preferred stock by considering the fair value of the debt-like component of the preferred stock corresponding to the liquidation preference, plus the fair value of the upside participation as a common stock equivalent. See paragraphs 6.09–18 for a discussion of the yield method. It would generally not be appropriate to use the CVM to estimate the fair value of debt and debt-like preferred instruments based on their recovery value.

Hybrid Methods

The hybrid method is a hybrid between scenario-based methods and OPM, estimating the probability-weighted value across multiple scenarios but using the OPM to estimate the allocation of value within one or more of those scenarios.

The hybrid method can be a useful alternative to explicitly modeling all scenario outcomes in situations when the company has transparency into one or more near-term exits but is unsure about what will occur if the current plans fall through. For example, consider a firm that anticipates an 80 percent probability of an IPO in nine months; however, if the IPO falls through due to market or other factors, the chances for a liquidity event are much more uncertain, and the firm is expected to remain private for three years. Under these circumstances, it might be appropriate to use a hybrid method. The value of the share classes under the IPO scenario might be based on the expected pricing and timing of the anticipated IPO, explicitly modeling this scenario. Then, an OPM with a three-year time to liquidity might be used to estimate the value of the share classes, using the conditional equity value assuming the IPO does not occur. In this instance, the resulting share values under each scenario would be weighted by their respective probabilities.

Another example in which a hybrid method would be appropriate would be if the portfolio company is in negotiations with investors and expects to close a new financing round at $4 per share in six months if it achieves a technical milestone, but if the financing does not occur, the company will likely close its doors and no classes of equity will receive a return. Under these circumstances, it might be appropriate to calibrate the
conditional equity value to the possible transaction using the OPM to solve for the equity value and corresponding value of each class of equity based on the $4 per share expected price for the new financing round. The resulting preferred and common stock values would then be weighted by the probability of achieving the technical milestone and discounted at a risk-adjusted discount rate for six months to estimate the value of each class of equity as of the valuation date.

8.63 Additional examples of situations in which a hybrid method would be appropriate were discussed previously in connection with scenario-based methods and OPM. See paragraphs 8.30 (b) and 8.50.

8.64 In applying a hybrid method, the fund will typically use a different current equity value within each of the relevant scenarios. For example, suppose there is a 40 percent probability that the portfolio company will obtain a contract with a major customer and will then be able to complete an IPO in one year and a 60 percent probability that the portfolio company will not get this contract and will instead choose to exit via a sale in two years. In this situation, the equity value used as an input to the OPM for the IPO scenario would be higher than the equity value used as an input to the OPM in the sale scenario, and the overall current equity value would reflect the weighting between the two. Similarly, suppose the overall current equity value considering all the risks is $50 million, but the valuation uses a hybrid method to explicitly model the 20 percent chance that the portfolio company will not obtain financing. Furthermore, suppose that if the portfolio company does not obtain financing, it will dissolve, returning $5 million to the investors. In this situation, the equity value in the success scenario is higher than the overall enterprise value because the $50 million equity value is the weighted average between the two scenarios. More specifically, the equity value in the success scenario would be $61.25 million, calculated as the $50 million overall equity value, less the value from the dissolution scenario (20 percent multiplied by $5 million), divided by the probability of the success scenario (80 percent). A best practice is to reconcile the probability-weighted present values of the future exit values to the overall equity value for the portfolio company estimated as discussed in paragraphs 7.03–.07, to make sure that the overall valuation of the portfolio company is reasonable.

8.65 In a hybrid framework, it is still important to reconcile the preferred stock values to the most recent transaction (subject to adjustments, as described in chapter 10, “Calibration”). This process involves developing the framework of the future scenarios, as described previously, and then calibrating the current equity values and probabilities for each scenario such that value for the most recent financing equals the amount paid.

8.66 An advantage of hybrid methods is that they take advantage of the conceptual framework of option pricing theory to model a continuous distribution of future outcomes and capture the option-like payoffs of the various share classes while also explicitly considering future scenarios and the discontinuities in outcomes that early-stage companies experience. A disadvantage is that these models require a large number of assumptions and may be overly complex.
Considerations in Selecting a Methodology for Valuing Equity Interests

8.67 The following flowchart and examples provide an overview of the factors that the fund may wish to consider when selecting a valuation approach for investments in equity interests, for most situations. Note that when a liquidity event is imminent or the fund has both seniority and control over the timing of exit, a CVM may be appropriate, and thus, the fund may not need to consider the flowchart.

Example #1 – Simple capital structure (see chapter 7, "Valuation of Equity Interests in Simple Capital Structures.")

8.68 In a simple capital structure (that is, when all outstanding shares are common or equivalents with the same rights and preferences), the fair value of the fund’s interest equals its pro-rata share of the total equity value. Since all investors have the same class of equity, more complex models such as scenario analysis or OPM are not required to allocate the equity value to the interest. When the company is ultimately sold or goes public, all investors will receive a pro-rata share of the value that is realized.
The allocation between shareholders will not be affected by the distribution of future outcomes (as could be the case if certain classes of equity were afforded downside protection under low value outcomes, but others were not). The equity value therefore can be measured considering the expected cash flows under current ownership through the future liquidity event and the investors’ required rate of return. Typical valuation practice is to estimate the fair value of the equity interest by measuring the enterprise value and subtracting the value of debt. See chapter 7, "Valuation of Equity Interests in Simple Capital Structures," for further discussion.

Example #2 – VC investment with bimodal outcomes or high probability of conversion

VC funds typically make initial investments in the form of Series A preferred stock with a 1x liquidation preference. The preferred stock is generally convertible into common stock on a 1:1 basis. The price of the preferred stock is typically negotiated using an agreed-upon post-money value for the enterprise, measured on a fully diluted basis. For example, if the agreed-upon post-money value is $10 million and there will be 10 million shares outstanding upon closing, the preferred stock would be priced at $1 per share. The founders often retain shares in the common stock in the enterprise, and later hires are typically granted options on the same shares.

As time passes, new rounds of financing are often used to fund operations, through the point where the company either fails or reaches sustained profitability. If the company is progressing well, new rounds of financing will typically have a structure similar to the original financing (that is, 1x liquidation preference, no dividends and pari passu with earlier rounds), but each subsequent round may have a higher purchase price, and hence a higher liquidation preference.

When measuring the fair value of convertible (non-participating) preferred stock where all the rounds are pari passu and convert at 1:1, funds frequently use the fully diluted equity value and allocate that value to the investor interests on an as-converted basis, consistent with the simplified scenario analysis approach described in paragraphs 8.21–.23. In explaining this approach, many funds note that the investors will realize value only through a sale of the company or an IPO and, as a result, their focus is on the company’s upside under which all the shares would convert. They also note that since outcomes for early-stage companies are generally bimodal, the fund typically would not receive much benefit from the liquidation preference. Therefore, investors typically do not believe that more complex models intended to differentiate the value associated with different liquidation preferences are needed.

When market participants would assume that it is highly likely that the preferred will convert at the liquidity event, or if the company is at such an early stage that the outcome

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19 The as-converted participation for each class is not necessarily the same as the fully diluted percentage participation because some shares may convert at more (or less) than 1:1. For example, conversion ratios higher than 1x may result from a ratchet feature (anti-dilution provision) or accrued dividends (through the expected liquidity event). When the conversion ratio for a given class is not 1x, the same approaches may be used by considering the as-converted participation rather than the fully diluted participation (that is, an investor that owns shares that converted at 2x would be allocated twice the value on a per-share basis as those that own shares that convert at 1x).
is likely to be bimodal (that is, there are no outcomes in which the liquidation preferences matter), using the fully diluted equity value and allocating the equity value to the investor interests on an as-converted basis may be appropriate, since the value of the liquidation preference is negligible in this case.

8.74 In addition, even if full credit is given to the liquidation preferences through the use of more complex models that consider a range of outcomes using a lognormal distribution such as an OPM or hybrid method, these analyses typically indicate that the differences in values due to differences between the preferred stock liquidation preferences tend to be relatively small.

Example #3 – Investments in participating preferred

8.75 In some cases, the investment may be in participating preferred (that is, preferred instruments with participation rights). A holder of these interests will share in the upside on an as-converted basis without having to forgo the liquidation preference for the interest. This structure is used for many PE-backed companies and some VC-backed companies. When the portfolio company is sold, the proceeds are typically distributed by first repaying the liquidation preferences for each participating preferred class of equity, then allocating the remaining value to all classes on an as-converted basis. Therefore, the participating preferred instrument may be considered as two components: a debt-like preferred instrument corresponding to the liquidation preference, plus an as-converted interest in the common.

8.76 In valuing a participating preferred instrument that is in a minority position, it is important to consider explicitly both the probability of conversion and the present value of the liquidation preferences, given the expected time to liquidity. As such, the CVM would generally not be an appropriate approach in this situation, and it may be necessary to model the complex payoff structure using a scenario analysis, OPM or hybrid approach. The OPM approach may be particularly appropriate if the liquidation preferences represent the majority of the total equity value, creating leverage that is much higher than is observable in the public debt markets as described in paragraph 6.27. In this case, the upside participation for the participating preferred and the common stock effectively have only option value, and the fair value of the liquidation preference can be measured as the total equity value less the option value for the upside, considering the expected time horizon of the investment. In lower leverage situations, the present value of the liquidation preferences may be estimated via the yield method, considering the payoff at the liquidity event (including accrued dividends, if any) discounted at an estimate of the required rate of return for those cash flows. The remaining value would then be allocated on an as-converted basis.

8.77 In a qualified IPO, the agreement may specify that the participating preferred instruments will automatically convert to common shares and lose their liquidation preference.20

20 Participating preferred may be used both in partnership or LLC structures and in corporate structures. Automatic conversion upon an IPO is more often specified in the articles of incorporation in corporate structures, since it is possible for a corporation to complete an IPO without restructuring, but investors in IPO markets typically will not
In these cases, the value of a liquidation preference in a participating preferred instrument may be estimated by considering the probability of a sale or other exit in which the preferred stock will retain its liquidation preference, and multiplying that probability by the present value of the liquidation preferences.

Example #4 – Investment where the dissolution scenario has value

8.78 For more established companies with complex capital structures, where the value of the portfolio company would be expected to rise or fall more smoothly based on the company’s performance, the liquidation preferences for preferred stock become more meaningful to the valuation. It would also be important to consider the liquidation preferences for VC-backed companies that have made enough progress that senior classes of equity would receive some value in a low-value sale or sale of assets (dissolution scenario), but that have not yet reached the point where it is highly likely that all classes of equity would convert. In these cases, because the outcome is generally not bimodal, it would be appropriate to use a forward-looking method such as a full scenario analysis, OPM or hybrid method to value the equity interests in the portfolio company, capturing the effect of the liquidation preferences considering the protection provided in the downside scenarios.

Other factors to consider

8.79 In valuing investments in portfolio companies with complex capital structures, it is important to consider the negotiation dynamics that led to the inclusion of additional preferred features and their ramifications in assessing the relative value of prior rounds. The following list describes a few additional factors that may be considered when assessing the appropriateness of a valuation methodology:

- If the preferred classes have differing seniority, it is important to consider why the seniority was negotiated and who controls the decision about the nature and timing of the ultimate liquidity event (for example, can the junior preferred investors initiate an IPO that forces conversion for the senior preferred, even if converting would not be optimal for the senior investors?) If new investors negotiated for seniority or greater than a 1x liquidation preference, the negotiations themselves may provide an indication that the liquidation preferences matter, so assuming a de minimis value for the liquidation preferences may not be reasonable.

- If the latest round of financing was sold with warrant coverage or a greater than 1x conversion ratio, then the price per common stock equivalent is lower than the nominal price per share from the financing. In these cases, care must be taken to agree to retain a capital structure where outstanding preferred stock has seniority over the common stock. For partnership and LLC structures, since these entities generally cannot complete an IPO directly, but instead must convert to a corporation or complete an IPO for a related entity that is structured as a corporation, the original partnership or LLC that issued the participating preferred may continue to exist and have the right to repayment of the liquidation preference, typically via conversion into common stock based on the price of the common stock at the conversion date. As always, it is important to consider the specific rights and preferences for the investment when performing the valuation.
assess the impact of these additional features when estimating the total equity value or post-money value and the implications for the valuation of the other classes of equity.

- In situations where a fund’s investment has seniority and the value of the company exceeds the liquidation preference but has declined since the initial investment, but the fund does not have the ability to redeem the investment or sell the portfolio company on the measurement date, it would generally be appropriate to mark down the investment, since the decline in the overall enterprise value implies that the investment is in a position of more risk.

- If the structure of the liquidation preferences is complex and there are plausible exit scenarios with values near the threshold where the junior preferred begin participating, it may be most appropriate to use a hybrid method to capture the impact of the liquidation preferences on the values of the senior and junior preferred classes.

- If a fund believes that the liquidation preferences are unlikely to have value in any exit scenarios, then the cash flows for all the classes of equity, including the common stock, would be the same. However, different classes of equity may still have different values if market participants investing in junior interests would require a higher rate of return due to increased risk, or if certain classes lack information rights and other protections that investors typically expect. See chapter 9, “Control and Marketability,” for additional discussion.