Financial Accounting Valuation Insights

Fair Value Measurement and the Use of Present Value Techniques

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Fair value measurements are being increasingly required for financial accounting purposes. Present value techniques are often an important component in estimating fair value. This article discusses FASB guidance on these techniques and their use in the valuation of businesses, business interests, and intangible assets.

Introduction

In February 2000, the Financial Accounting Standards Board (FASB) issued FASB Concepts Statement No. 7, *Using Cash Flow Information and Present Value in Accounting Measurements*. Since that time, the FASB has referred to Concepts Statement No. 7 in pronouncements which include the measurement of fair value, including SFAS No. 142, *Goodwill and Other Intangible Assets*. However, many valuation analysts and accounting professionals have questioned the present value techniques presented in Concepts Statement No. 7.

In June 2004, the FASB decided to address those questions and include the related guidance as an appendix in the exposure draft of a proposed SFAS *Fair Value Measurements* ("the Exposure Draft"). The guidance would be elevated to Level A GAAP and would apply to all pronouncements in which present value is used to estimate fair value. The proposed Statement would not amend Concepts Statement No. 7. Rather, it is intended to clarify the present value guidance in Concepts Statement No. 7.

This article (1) provides an overview of the present value techniques presented in Concepts Statement No. 7 and in the Exposure Draft and (2) addresses the application of present value techniques in the context of business valuation.

Concepts Statement No. 7

Concepts Statement No. 7 presents two approaches to computing present value: (1) the traditional approach and (2) the expected cash flow approach. The traditional approach uses a single set of cash flow estimates and a single interest rate, often described as "the rate commensurate with the risk." The cash flow is contractual cash flow, or (when contractual cash flow is not available), an estimate of the single most likely amount or best estimate. In statistical terms, the "best estimate" would be the estimated mode of a range.

The expected cash flow approach is considered by the FASB to be a more effective measurement tool than the traditional approach in many situations. The expected cash flow approach uses all expectations about possible cash flow—instead of the single most likely cash flow. The discount rate only considers the time value of money, represented by the risk-free interest rate.

Exposure Draft on Fair Value Measurements

The Exposure Draft focuses on the same two approaches discussed in Concepts Statement No. 7. However, it uses different terms for each approach. The traditional approach is renamed "the discount rate adjustment technique," and the expected cash flow approach is renamed "the expected present value technique." To convey its intent more clearly, the FASB expanded its guidance to clarify that, when using expected cash flow, the adjustment for risk may be reflected in either (1) the expected cash flow or (2) the discount rate. Further, the risk-free interest rate is the appropriate discount rate only if the adjustment for risk is reflected in the expected cash flow.

According to the FASB, a fair value estimate using present value should capture the following elements that (taken together) would make up the price at which an asset or liability could be exchanged in a transaction between knowledgeable, unrelated willing parties:

1. an estimate of future cash flow;

2. possible variations in the amount and (or) timing of the cash flow;
3. the price for bearing the uncertainty inherent in the cash flow;
4. the time value of money, represented by the risk-free interest rate;
5. other case-specific factors, such as liquidity and market imperfections; and
6. in the case of a liability, the effect of an entity's creditworthiness.

Present value techniques differ in how they incorporate these elements. However, regardless of the technique used, certain general principles apply:

1. Cash flow estimates and discount rates should reflect assumptions that marketplace participants would use in their estimates of fair value.
2. Cash flow estimates and discount rates should consider only factors related to the asset (or liability) being measured.
3. To avoid double counting or omitting the effects of risk factors, discount rates should reflect assumptions about risk that are not otherwise considered in the cash flow projection. For example, a discount rate that reflects expectations about future defaults is appropriate if using contractual cash flow of a loan (discount rate adjustment technique), but not if using expected (probability-weighted) cash flow (expected present value technique). This is because expected cash flow already reflects assumptions about future defaults.
4. Assumptions about cash flow estimates and discount rates should be internally consistent. For example, nominal cash flow (which includes the effect of inflation) should be discounted at a rate that includes the effect of inflation. Similarly, real cash flow (which excludes the effect of inflation) should be discounted at a rate that excludes the effect of inflation.
5. Discount rates should be consistent with the underlying economic factors of the currency in which the cash flow estimates are denominated.

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Discount Rate Adjustment Technique

The discount rate adjustment technique uses a single set of cash flow estimates from the range of possible estimated amounts. For example, such cash flow estimates may be contractual cash flow or, if contractual cash flow is not available, the single, most likely amount in a range of possible estimated amounts (i.e., the best estimate). The cash flow estimates are discounted at a rate commensurate with the risk inherent in the cash flow (i.e., the risk-adjusted discount rate).

The Exposure Draft discusses the derivation of the discount rate to use in applying the discount rate adjustment technique. However, as discussed below, the discount rate adjustment technique is not applicable to fair value measurements for nonfinancial assets, such as reporting units and intangible assets. Therefore, no further discussion on the technique is presented in this article.

Expected Present Value Technique

The expected present value technique begins with a cash flow estimate that, in theory, represents the sum of all possible cash flow, each weighted by its probability. The weighting is the probability weighting of all possible outcomes (i.e., all expected cash flow estimates). It then reflects the market-required risk premium for the risk inherent in the expected cash flow (not otherwise reflected in the cash flow) using one of two methods.

Under Method 1, the expected cash flow (1) is explicitly adjusted (reduced) for risk (risk-adjusted expected cash flow) and (2) discounted at a risk-free interest rate, similar to a certainty-equivalent cash flow for an asset. Under Method 2, the expected cash flow is discounted using a rate commensurate with the risk inherent in the expected cash flow (risk-adjusted discount rate). In other words, an expected present value technique requires an adjustment for risk in either (1) the expected cash flow or (2) the discount rate, depending on whether Method 1 or Method 2 is applied.

While some analysts have held the view that the expected present value technique is not widely used or accepted by valuation analysts, the use of expected cash flow in the context of business valuation is theoretically correct.

According to the widely used finance text *Principles of Corporate Finance*:

> The opportunity cost of capital for an investment project is the expected rate of return demanded by investors in common stocks or other securities subject to the same risks as the project. When you discount the project's expected cash flow at its opportunity cost of capital, the resulting present value is the amount investors (including your own company's shareholders) would be willing to pay for the project.[1]

In both *Cost of Capital* and *Business Valuation Body of Knowledge*, Shannon Pratt writes:

> Net cash flows to be discounted or capitalized should be expected values—that is probability-weighted cash flows. While valuation analysts typically do not have the luxury of a distribution of possible cash flows for each future period, it is useful to understand the concept. It may lead the analyst to adjust a projected number if a skewness of possible outcomes is expected.
>
> If the distribution of possible cash flows is symmetrical above and below the most likely cash flow in that period, then the most likely cash flow is equal to the probability-weighted cash flow (the mathematically expected value of the distribution. However, many distributions of possible cash flows are skewed.[2]

The use of expected cash flow is also discussed in the *Stocks, Bonds, Bills, and Inflation Valuation Edition Yearbook* published by Ibbotson Associates:

> Another common mistake in the income approach is the use of a "most likely"—as opposed to an expected—cash flow. The calculation of an expected cash flow requires the estimation of future cash flows under different scenarios, to which probabilities are attached.[3]

Determination of Expected Cash Flow

The set of cash flow estimates used for the expected present value technique, in theory, represents the probability weighting of all possible outcomes. However, an entity does not need to consider distributions of all possible cash flow estimates using complex models and techniques in order to determine the expected cash flow. Rather, even in cases in which an entity has access to limited data, it should be possible to analyze the array of possible cash flow estimates without using complex models and techniques.

Each application of the expected present value technique will differ based on (1) the facts and circumstances of each measurement situation, (2) available information, and (3) the judgments applied. Such judgments include determining (1) whether to apply a continuous or discrete probability distribution and (2) if a discrete probability distribution is applied, the number of discrete scenarios.

The probabilities do not have to be very precise. And, the judgments may be subjective as long as the resulting measurement incorporates all of management's understanding of amount, timing, and uncertainty. At the same time, management should not make up what they do not know. Following the issuance of Concepts Statement No. 7, the FASB issued a series of articles focused on enhancing the understanding of the Concepts Statement. In the first of these articles, the authors wrote, "To judge by the comment letters, many have interpreted Concepts Statement No. 7 as far more complex and difficult than the Board intended."[4]

The following examples present various scenarios faced by companies. They also discuss how the expected cash flow would be determined in each case.

Scenario 1

Management estimates that historical cash flow for some past period is the best indication of future cash flow. And, management's best estimate of the future growth rate for cash flows is 5 percent. If management believes that the distribution of possible growth rates is symmetrical around the best estimate (i.e., a normal distribution), the expected growth rate is equal to the single best estimate of the growth rate. No further steps would be required to determine the expected cash flow, and the capitalization of earnings (cash flow) method could be used.

Scenario 2

Management prepared a single set of projections. The projections reflect management's single best estimate of the future cash flow. If management believes that the distribution of possible outcomes in each year is symmetrical around the best estimate, the expected cash flow is equal to the single best estimate cash flow. Therefore, no further steps would be required in order to use the discounted cash flow method.

Scenario 3

Management estimates that historical cash flow for some past period is the best indication of future cash flow. And, management concludes the estimated growth rate falls somewhere between 4 percent and 8 percent. However, no amount in the range is more likely than any other amount (representing a uniform distribution). Based on that limited information, the expected growth rate is 6 percent [(4% + 8%)/2]. In this case, the single best estimate (most likely) growth rate cannot be determined. This is because each possible outcome is equally likely.

Scenario 4

Management estimates that the single best estimate (most likely) growth rate is 5 percent. The best case scenario is that the growth rate will be 10 percent, and the worst case is that the growth rate will be 0 percent. Management con-

cludes that the best case is about one-half as likely as the most likely case. Management concludes the worst case is about one-third as likely as the best.

The resulting probabilities will be 0 percent with a 10 percent probability, 10 percent with a 30 percent probability, or 5 percent with a 60 percent probability (representing a discrete distribution). Based on that limited information, the expected growth rate is 6 percent [(0% × 0.10) + (10% × 0.30) + (5% × 0.60)]. In this case, the single best estimate (most likely) growth rate is 5 percent because it has the highest probability (60 percent). Differences such as this will occur when there is a skewed distribution.

Scenario 5

Management prepared a projection of the cash flow to be generated by a new product. The probability of the new product being successfully launched is 80 percent. Therefore, in order to determine the expected cash flow, the projected cash flow is multiplied by the 80 percent probability of success.

Methods under the Expected Present Value Technique

The Exposure Draft presents two alternative (but equivalent) methods under the expected present value technique. Each of these methods is consistent with financial theory.[5] Method 1 represents the certainty-equivalent method. And, Method 2 represents the risk-adjusted discount rate method. Both methods make the same adjustment for risk in either (1) the expected cash flow or (2) the discount rate. Therefore, both methods result in the same present value.

The following simplified example from the Exposure Draft shows the equivalence of both methods.

Assume that an asset has expected cash flow of $780 in 1 year. The applicable risk-free interest rate for cash flow with a 1-year time horizon is 5 percent, and the risk premium is 3 percent. The expected present value of the asset is $722, whether under (1) the certainty-equivalent method or (2) the risk-adjusted discount rate method.

Under the certainty-equivalent method, the expected cash flow is explicitly adjusted for risk. Using the concept of certainty equivalents, the risk adjustment (based on the risk premium of 3 percent) is $22 ($780 – [$780 × (1.05 ÷ 1.08)]). This adjustment results in a risk-adjusted expected cash flow of $758 ($780 – $22). In that case, the $758 is the certainty equivalent of $780, and it is discounted at the risk-free interest rate (5 percent). The expected present value is $722 ($758 ÷ 1.05).

Under the risk-adjusted discount rate method, the expected cash flow is discounted at a risk-adjusted discount rate of 8 percent (the 5 percent risk-free interest rate plus the 3 percent risk premium). The expected present value is $722 ($780/1.08).

As indicated in the above example, the risk adjustment in the certainty-equivalent method is equal to ratio of the certainty-equivalent cash flow (CEQ_1) to the expected cash flow (C_1) is determined as follows:

$$\text{Ratio of } CEQ_1 \text{ to } C_1 = \frac{1+k}{1+k_f}$$

where k is the risk-adjusted discount rate and k_f is the risk-free rate.

In a multi-period model the ratio of the certainty-equivalent cash flow to the expected cash flow in each year (denoted as t) is:

$$\text{Ratio of } CEQ_t \text{ to } C_t = \frac{(1+k)^t}{(1+k_f)^t}$$

Comprehensive Example

For example, lets assume that a Company's growth expectations for the next five years are the same as presented in the above Scenario 4. At the end of the fifth year, the value of the Company is expected to be equal to five times its cash flow in year five. The applicable risk-free interest rate is 5 percent. And, the risk premium is 7 percent. The sum results in a risk-adjusted discount rate of 12 percent.

As indicated in Exhibits 1 and 2, the present value using the certainty-equivalent method is equal to the present value using the risk-adjusted discount rate method.

Summary and Conclusion

The Exposure Draft has provided clarity and guidance regarding the use of present value techniques in determining fair value. It is especially helpful that the Exposure Draft (1) elaborates on the expected present value technique and (2) discusses the use of the risk-adjusted discount rate method under this technique. This method is consistent with the present value methodology traditionally used in business valuation.

When released, the *Fair Value Measurement Statement* will elevate the guidance for using present value techniques to estimate fair value to Level A GAAP. As a result, both valuation analysts and accountants should be familiar with (1) the present value techniques presented in the Statement and (2) the proper application

of these techniques in the valuation of businesses, business interests, and intangible assets.

Notes:

1. Richard A. Brealey and Stewart C. Myers, *Principles of Corporate Finance*, 6th ed. (New York: McGraw-Hill, 2000), p. 20.
2. Shannon P. Pratt, *Cost of Capital: Estimation and Applications*, 2nd ed. (New York: John Wiley & Sons, 2002) p. 17, and *Business Valuation Body of Knowledge* (New York: John Wiley & Sons 2003), p. 123.
3. *Stocks, Bonds, Bills and Inflation Valuation Edition 2005 Yearbook* (Chicago: Ibbotson Associates, 2005), p. 16.
4. Edward W. Trott and Wayne S. Upton, "Expected Cash Flows," *Understanding the Issues*, May 2001, p. 1.
5. A discussion of the two methods appears on pages 242 through 246 of *Principles of Corporate Finance*.

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Exhibit 1
Risk-Adjusted Discount Rate Method

	Growth Rate	Probability	Year 1	2	3	4	5	Terminal Year
Best case scenario	8%	0.3	1,000.0	1,080.0	1,166.4	1,259.7	1,360.5	6,802.4
Most likely scenario	5%	0.6	1,000.0	1,050.0	1,102.5	1,157.6	1,215.5	6,077.5
Worst case scenario	0%	0.1	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	5,000.0
Expected cash flow			1,000.0	1,054.0	1,111.4	1,172.5	1,237.5	6,187.3
times: Present value factor at 12%			0.8929	0.7972	0.7118	0.6355	0.5674	
equals: Present value of discrete cash flow			892.9	840.2	791.1	745.1	702.2	
Total present value of discrete cash flow			3,971.5					
plus: Present value of terminal value			3,510.8					
equals: Total present value of cash flow			8,375.2					

Exhibit 2
Certainty-Equivalent Method

	Growth Rate	Probability	Year 1	2	3	4	5	Terminal Year
Best case scenario	8%	0.3	1,000.0	1,080.0	1,166.4	1,259.7	1,360.5	6,802.4
Most likely scenario	5%	0.6	1,000.0	1,050.0	1,102.5	1,157.6	1,215.5	6,077.5
Worst case scenario	0%	0.1	1,000.0	1,000.0	1,000.0	1,000.0	1,000.0	5,000.0
Expected cash flow			1,000.0	1,054.0	1,111.4	1,172.5	1,237.5	6,187.3
times: Certainty equivalent adjustment			0.9375	0.8789	0.8240	0.7725	0.7242	0.7242
equals: Certainty equivalent cash flow			937.5	926.4	9.5.8	905.7	896.2	4,480.8
times: Present value factor at 5%			0.9524	0.9070	0.8638	0.8227	0.7835	
equals: Present value of discrete cash flow			892.9	840.2	791.1	745.1	702.2	
Total present value of discrete cash flow			3,971.5					
plus: Present value of terminal value			3,510.8					
equals: Total present value of cash flow			8,375.2					