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Investment Actuary Symposium Fair Valuation of Liabilities: Theoretical Considerations

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Editor's Note: *Luke Girard's article was first printed nearly 10 years ago (Risk & Rewards newsletter, February 2001), summarizing a scientific paper that he had written to address the differences and similarities between the option pricing method (now more commonly known as fair valuation) and the actuarial appraisal method. Attempting to use the article's recommended option pricing method" 10 years ago to price LTC products would have appeared daunting. Today, LTC actuaries have better tools available, and they have a better handle on the lapses and mortality anticipated for policyholders. Therefore, two of the previously daunting concerns for using the option pricing method" have been largely addressed. Perhaps it is now time for LTC actuaries to consider the advantages of the option pricing method," particularly one that is emphasized in the article. The option pricing method "is also independent of the investment strategy that is being used to fund the liabilities."*

Is it better to be precisely wrong or approximately right? This question is at the center of the battle between historical cost and market value accounting. Current market value is highly relevant, but its accuracy is limited. Historical accounting, on the other hand, is highly accurate, but is of little relevance. The following quote is from Diana Willis at the FASB.

"The old model with its historical-price based measures provides less relevant information than today's dynamic capital markets need, and it cannot cope with today's complex financial instruments and risk-management strategies—much less tomorrow's."

The quote clearly indicates that the FASB has shifted toward increased relevancy. This increased emphasis does not necessarily have to come at the expense of less accuracy, since there have been advances in both valuation methodology and information technology."

The two leading methods for doing a fair valuation of liabilities are the *option pricing method* and the

actuarial appraisal method. While they have wide acceptance, they also appear to contradict each other in many ways. A task force formed by the American Academy of Actuaries coined the term "option pricing method." This task force produced a position paper that catalogued seven possible methods, one of which was the option pricing method.

The option pricing method has also been referred to as the "direct method," since liability cash flow is discounted at the risk-free rate plus a spread. Included in liability cash flow is premium and benefit cash flow along with expenses. This valuation method is consistent with the way assets are valued in the capital markets. If cash flow is certain, the discount rates are the spot rates. If cash flow is uncertain, we need to generate interest rate scenarios, and then, to complete the valuation, we need to probability weight the path-wise present values for each scenario. The option pricing method has many advantages. The valuation method is independent of statutory accounting, risk-based capital and taxes. It is also independent of the investment strategy that is being used to fund the liabilities. Assumptions can be objective if they are derived from the marketplace. For all these good reasons, it is preferred by accountants and corporate finance professionals.

The actuarial appraisal method has also been referred to as the *indirect method* because it is deduced indirectly from an actuarial appraisal. An actuarial appraisal is fundamentally based on discounting free cash flow. Free cash flow is discounted at the cost of capital in order to derive what is called DDE or *discounted distributable earnings*. The fair value of liabilities is deduced by deducting DDE from the market value of the assets. The actuarial appraisal method has many advantages. It is based, of course, on free cash flow, which depends on the important realities of statutory accounting, taxes, and the investment strategy. It is flexible since it can incorporate actuarial assumptions of mortality, morbidity and lapsation. It is generally accepted as a valuation basis in the merger and acquisition marketplace.

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As different as these two methods appear to be, they can be reconciled. In fact, it can be shown that they produce exactly the same result if we are careful in applying consistent assumptions in each case. This equivalence is based on pure algebra. To see this, we start with the actuarial appraisal method and define a term called *required profit*. This is the pretax profit that needs to be generated by the product in order to earn the cost of capital. If this profit is generated, the shareholders should be satisfied since the company will earn its cost of capital. Next we define a term called the *liability spread* as the asset spread minus the ratio of required profits over the fair value of liabilities, where the asset spread is the expected return of the assets over the risk-free rate. Note that because this is an actuarial appraisal, the liability spread depends on investment strategy, risk-based capital, statutory accounting, cost of capital and taxes. If we add the liability spread to the risk-free rate and discount liability cash flow directly, we get exactly the same result as the actuarial appraisal method. No new information is being created by doing an actuarial appraisal in this way. In essence, this is a tautology.

The new information is that there is no new information. Critics of this line of reasoning have pointed to the existence of a “circularity” in the derivation of the option pricing method from the actuarial appraisal method. This circularity results from the fair value of liabilities being dependent on the required profit, which is in turn dependent on the fair value of liabilities. While it exists, it does not invalidate the conclusion, although it does make the mathematics somewhat challenging (see Girard 2000-1).

Many practitioners, in declaring that these methods are different, are not being diligent in ensuring that assumptions are being applied consistently between the two methods. Whether assumptions are derived implicitly or explicitly or whether each method uses different assumptions should not be sufficient cause to view these methods as being different. After all, within each method different methods exist for developing assumptions. If this were a sufficient argument to make the two methods different, then we would arrive at the absurd conclusion that each method would be different from itself. Thus, if we make exactly the same assumptions in applying each method, we will get exactly the same result. This makes the two methods equivalent.



Now that we have established that the two methods are equivalent, we are ready to move to the next stage, which is the choosing of assumptions for the valuation or accounting policy. Let's assume that we have perfect markets, as Modigliani and Miller contemplated back in 1958, when they wrote their celebrated paper concerning the cost of capital (see Modigliani and Miller 1958 and 1963).

If we have perfect markets, M&M concluded that we must use a leverage-adjusted cost of capital when discounting free cash flow. M&M derived the leverage-adjusted cost of capital under the assumption of a steady state. This assumption is not appropriate for most fair valuation situations, since fair valuations have finite horizons and cash flow can vary for each period. However, the leverage-adjusted cost of capital can be generalized to accommodate finite horizons and varying cash flow (see Girard 2000-2).

If we assume a leverage-adjusted cost of capital, then the liability spread reduces to or converges to the debt spread. This debt spread is the funding cost for the firm in excess of the risk-free interest rate or, stated differently, the debt spread plus the risk-free rate is the market cost of debt for the firm.

There are many reasons to suggest that it is quite sensible to use a leverage-adjusted cost of capital as the policy when doing an actuarial appraisal. For example, everyone would agree that if you have a riskier investment strategy, you should be using a higher discount rate.

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CONTINUED ON PAGE 8

If the level of risk-based capital is lower, you have more leverage and this should result in a higher discount rate. Also, if the reserve basis is weak, this means higher leverage, which should translate into a higher discount rate. A leverage-adjusted cost of capital has all these desirable attributes. Furthermore, using a “risk-adjusted rate of turn” may be required under the actuarial standards of practice in order to reflect the risk of leverage. At least, appropriate disclosure may be necessary if the discount rate does not reflect all risks (*see section 5.2.2 of Actuarial Standard of Practice No. 19 - Actuarial Appraisals*).

The insurance markets are not perfect. Life insurance policies do not trade in the capital market as treasury bonds do. Therefore, it is quite natural and appropriate to critique this assumption. So, why should we make the perfect market assumption? First, it is a good idea to have an internally consistent valuation process, and the perfect market assumption helps you achieve that consistency. Second, the perfect market assumption is consistent with asset valuation.

This assumption is generally made on the asset side of the balance sheet to value similar risks such as interest rate risk and equity market risk. Third, the assumption is objective; the information used in the valuation process comes from the market and is not subjectively derived by management.

Objectivity is good because it helps to ensure comparability between companies. Finally, the perfect market assumption insures that you have a willing buyer and a willing seller, which is a generally accepted guideline in a fair valuation.

In doing an actuarial appraisal, the assumption is often made that the cost of capital is constant. A more sophisticated assumption would be to assume that the cost capital is equal to the risk-free interest rate plus a spread. These assumptions are usually made when calculating an option *adjusted value of distributable earnings* (OAVDE). The pitfall is that, if you do this, you are implicitly assuming that leverage is constant over both state and time.

However, leverage is not static. It can be quite dynamic. Leverage can be very large, it can be very small, and it can even be negative. The existence of dynamic leverage is problematic when valuing merger and acquisition transactions at one single

corporate hurdle rate or at the risk-free interest rate plus a static spread. Depending on the circumstances, this practice could easily result in mispricing a transaction.

It has been said that it is not the objective of FASB to measure the distributable earnings capacity of the firm. In fact, that is exactly what we are doing when we are calculating fair values by discounting liability cash flows directly at the risk-free interest rate plus the firm’s debt spread. We have also been told that when doing a fair valuation, we should not be discounting liability cash flow at the company’s investment earnings rate less a profit margin. In fact, that’s what we are implicitly doing when we are doing a fair valuation using the option pricing method.

In summary, we started off with the actuarial appraisal method. We reformulated the actuarial appraisal method into the option pricing method format. We then made the assumption that liabilities are freely traded in perfect markets. From all this, we concluded that liability cash flow should be discounted at the risk-free interest rate plus the firm’s debt spread and then we make an adjustment for taxes. ■

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