How to Derive the Discount Rate When Calculating Economic Losses

One-Stage vs. Two-Stage Model

by Frank A. Wisehart, CPA, CVA, CFE

In business litigation, the courts have offered little guidance on appropriate discount rates for economic losses. In the absence of substantive legal guidance, the valuation profession has generated a number of methods including a "One-Stage" model which relies on subjective analysis and a "Two-Stage" model which uses a probability approach. In this article, I will explain the two approaches and explain why I believe the latter approach is preferable.

To calculate the discount rate to apply in damage models, you need to assess two factors:

1. The systematic risk, which includes the risk-free rate of a U.S. Treasury bond or note plus a premium for the equity risk, and
2. The unsystematic risk or subjective risk such as financial risk, management risk, product risk and business environment risk.[1]

Unsystematic risk is the most subjective part of any damage claim analysis. Since the time period extends from the date of the breach to several years in the future (see sidebar, page 00), the ability to accurately predict future losses decreases.

The Two-Stage Model

The Two-Stage model, addresses unsystematic risk by using a probability table for calculating economic losses. The probability of achieving the result lessens as time passes. Traditionally, valuation analysts apply a single probability factor to the overall results. In other words, "there is X percent of achieving Y's calculated result."

Rather than use a single probability for a series of given results, you can develop the two-stage model to encompass a series of projections over a longer period of time. This concept is illustrated in **Figure 1**.

For example, a 95 percent probability factor could be applied to an expected result of $100 one year from the damage date. Applying this 95 percent probability factor reduces the model's calculation of damages to $95 in year one. Continuing, each year can be assigned a declining probability factor. Applying a 90 percent weight to year two would reduce the expected future result of $100 to $90.

[1] Modeling and Discounting Future Damages, Robert L. Dunn and Everett P. Harray, Journal of Accountancy, January 2002

Figure 1 shows how this model works. If the lost income one year from the date of a breach is $1,000, and a 95 percent probability of achieving the expected result is used, the unsystematic risk-adjusted outcome for year one is $950. If the lost income five years from the date of breach is $1,126 and a 75 percent probability is used, the unsystematic risk-adjusted outcome for year five is $844. Adding the results together produces a total unsystematic risk-adjusted lost income of $5,309 over six years.

Figure 1

SAMPLE COMPANY
Calculation of Lost Income
From date of breach to six years after date of breach

	Years after breach						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Total**
Total Lost Income	$ 1,000	$ 1,030	$ 1,061	$ 1,093	$ 1,126	$ 1,159	$ 6,468
Probability	95%	90%	85%	80%	75%	70%	
Unsystematic risk adjusted lost income	$ 950	$ 927	$ 902	$ 874	$ 844	$ 811	$ 5,309

Next, systematic risk must be assessed. As we discussed, systematic risk can be calculated by adding the risk-free U.S. Treasury rate and an equity risk premium together. Assume a risk-free rate of 5.5 percent and an equity risk premium of 3.5 percent. The result is a systematic risk rate of 9.0 percent. This is shown below in Figure 2.

Figure 2

SAMPLE COMPANY
Calculation of Lost Income
From date of breach to six years after date of breach

	Years after breach						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Total**
Total Lost Income	$ 1,000	$ 1,030	$ 1,061	$ 1,093	$ 1,126	$ 1,159	$ 6,468
Probability	95%	90%	85%	80%	75%	70%	
Unsystematic risk adjusted lost income	950	927	902	874	844	811	5,309
9.00% Systematic risk	0.92	0.84	0.77	0.71	0.65	0.60	
Risk adjusted lost income	$ 872	$ 780	$ 696	$ 619	$ 549	$ 484	$ 4,000

In Figure 2, the unsystematic risk-adjusted lost income is reduced by the 9.0 percent systematic risk rate factors over six years. The total (unsystematic and systematic) risk discounted loss is $4,000.

The One-Stage Model

Our systematic discount rate of 9.0 percent included a risk-free rate of 5.5 percent and an equity risk premium of 3.5 percent. By adding an unsystematic risk factor to the 9.0 percent systematic risk rate, the damages can be calculated in one stage compared to the two stage model in examples in Figures 1 and 2.

In our example the same total result, $4,000 in losses, can be duplicated. Add a 6.3 percent unsystematic risk factor to the 9.0 percent systematic risk rate to produce an overall discount rate of 15.3 percent. Applying this 15.3 percent discount rate to the total lost income in one step produces the same risk adjusted lost income of $4,000 compared to the previously discussed two-stage model over the same six-year period (see Figure 3).

In other words, the models intersect at 15.3 percent in the single-stage model and at the selected probability table in the two-stage model. Using a discount rate greater than 15.3 percent produces a lower overall damage calculation than the probability model.

Figure 3

SAMPLE COMPANY
Calculation of Lost Income
From date of breach to six years after date of breach

	Years after breach						
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Total
Total Lost Income	$ 1,000	$ 1,030	$ 1,061	$ 1,093	$ 1,126	$ 1,159	$ 6,468
15.3% Discount rate	0.87	0.75	0.65	0.57	0.49	0.43	
Risk adjusted lost income	$ 867	$ 775	$ 692	$ 618	$ 552	$ 495	$ 4,000

If the mathematical result is the same, what is the difference? The difference lies in the details. Both models define systematic risk as the risk-free rate added to the equity risk premium. In our example, the systematic risk rate was 9.0 percent. The components of the systematic rate could include Ibbotson's *SBBI Yearbook*[2] values for the risk-free rates of return and an appropriate equity risk premium. Most analysts are comfortable

[2] Ibbotson Associates Stocks, Bonds, Bills and Inflation Valuation Edition 2004 Yearbook

discussing these building block foundations. Once the systematic risk rate is calculated, however, the presentations change.

In the single-stage model, an additional unsystematic risk premium is added to the systematic risk rate. In figure 3, an additional 6.3 percent of unsystematic risk was added to the systematic risk rate of 9.0 percent to produce an overall discount rate of 15.3 percent. This produces a flat-rate discount model. In other words, 15.3 percent is used to discount every year's lost income amount. In this example, after explaining the systematic discount, the analyst must explain why an additional 6.3 percent discount was used. There are several arguments available to assist a discussion on unsystematic risk. These include:

1. Size premiums
2. Industry premiums
3. Company-specific premiums
4. French-Farma factors
5. Black Green factors, etc.

Essentially, these factors boil down to whether or not a compelling argument can be made as to why 6.3 percent was selected versus 5.3 percent versus 7.3 percent, etc. This may include three to ten factors (or more) of 0 percent to 2 percent each. Legal counsel may argue about each and every factor considered, in addition to those factors not considered.

In the two-stage damage model, the argument before the court may be limited to the appropriateness of the damage period selected rather than the subjectivity of unsystematic risk weighted factors. Why is this important? Courts generally are more comfortable selecting time periods for calculating damages than they are at selecting appropriate discount rates. (See Sidebar page ##, "Selecting a Time Frame for the Probability Model"). If courts recognize a 20-year damage model, then a straight-line approach can be developed (i.e., 95 percent, 90 percent, 85 percent,....5 percent) to account for unsystematic risk. In this example a 20-year model reduces by 5 percent its probability. In the twentieth year only 5 percent of the amount predicted is used in the final damage calculation.

In the twenty-first year, the model reduces the economic losses to zero. As a result, reconciliation occurs between the damage period used for the calculation and the time period a court may recognize for calculating economic losses.

Conclusion

As the damage calculation from the date of the breach becomes more distant, the precision available to the damage calculation decreases.

Judges and juries understand what intuitively is true. The ability to accurately predict a future outcome erodes with the passage of time. In many cases, I believe that the two-

stage probability damage model using a series of projections and probabilities tracks this concept more closely than the single-stage, flat discount rate damage model.

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[sidebar]

Selecting a Time Frame for the Probability Model

The courts have provided guidance for projecting an appropriate damage period in lost income cases. The time period associated with lost income damages can vary based upon the circumstances of the breach.

In *Multi-Channel TV Cable Co. v. Charlottesville Quality Cable Corp.*,[3] a dispute arose between competing cable television operators. In this case, two cable providers competed for subscription-based service business. Charlottesville Quality Cable disconnected the services of Multi-Channel to certain multi-family dwelling units. As a result, Multi-Channel lost subscribers. Multi-Channel sued. In this case an 11-year damage calculation was approved by the court in calculating lost income.

In *Superbird Farms, Inc. v. Perdue Farms, Lin*.[4] the lost profits recovered were based upon a 15-year lease.

In *Van Riper v. Ford New Holland Inc*.[5] a franchisee sued for damages relating to an improperly terminated franchise agreement. A 10-year projection of lost profits damages to a franchisee for breach of a franchise agreement was used.

In Texas, *America's Favorite Chicken Co., v. Samaras*[6] a 20-year projection was approved to calculate damages in a breach of employment contract dispute.

Damage periods longer than 20 years have normally been rejected. *Chitwood v. A.O. Smith Harvestore Products, Inc*.[7] was an action arising from the alleged failure of a feed silo. A 25-year damage period calculation was rejected because a subsequent fire damaged the silo. Despite the fire, the court was skeptical of a 25-year projection.

"In *Hawkinson v. Johnston*, supra, defendant repudiated a 99-year lease with 67 years left to run. The court treated the repudiation as a total breach of the lease for which full damages should be awarded. The court held, however, that damages were predictable

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[3] Multi-Channel TV Cable Co. v. Charlottesville Quality Cable Corp., 65 F.3d 1113 (4th Cir. 1995)
[4] Superbird Farms, Inc. v. Perdue Farms, Lin., 970 F2d238 (7th Cir. 1992) (discussed in §6.21)
[5] Van Riper v. Ford New Holland, Inc., 261 Mont. 206, 862 P.2d 47 (1993)
[6] Texas America's Favorite Chicken Co., v. Samaras, 929 S.W. 617 (Tex. App. 1996) (discussed in § 5.12)
[7] Chitwood v. A.O. Smith Harvestore Products, Inc., 170 Wis. 2d 622, 489 N. W. 2d 697 (Wis. App. 1992), review denied, 494 N.W.2d 210 (Wis. 1992) (discussed in §3.21)

with reasonable certainty for only 10 years and accordingly awarded damages calculated on lost rentals on a 10-year basis."[8]

A similar circumstance occurred in *Palmer v. Connecticut Railway & Lighting Co*. The contract which was breached was to run an additional 969 years. The court awarded a recovery period limited to eight years due to the uncertainty of projections beyond 40 years.[9]

Based upon the foregoing, loss estimate projections used in courts range from about eight years to twenty years.

– Frank A. Wisehart

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Bio:
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[8] Recovery of Damages for Lost Profits Supplement, Volume 1 , Robert L. Dunn, Fifth Edition, Lawpress, September 2004, (discussed in §6.19), Page 489
[9] Palmer v. Connecticut Railway & Lighting Co., 311 U.S. 544 (1941)