DISCOUNTING LOST PROFITS IN BUSINESS LITIGATION: WHAT EVERY LAWYER AND JUDGE NEEDS TO KNOW

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According to legend, Albert Einstein once said that compound interest is the most powerful force in the universe.[1] Whether one agrees or not, there can be no doubt that compound interest has a huge effect on damage awards in business cases. Unfortunately, many judges and lawyers find the principles that govern compound interest in the context of damage awards as obscure as special relativity. As a result, they make multi-million dollar errors when they decide or settle cases.[2] In reality, the principles involved are not that difficult to understand. This article will attempt to explain the concepts in a way that lawyers and judges without backgrounds in economics or finance can understand. By analyzing relevant case law, this article will explain which courts got it right and which courts were taken in by expert witnesses.

I. THE PROBLEM

In major business litigation, the main item of damages is usually the profits that the plaintiff would have made but for the defendant's conduct. The interest rate the court uses to discount these profits to present value (the "discount rate") will usually make a large difference in the amount that the court awards as damages for such things as breaches of contract, antitrust violations, infringements of intellectual property rights, and interference with prospective economic advantage.[3] In some instances, the

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[1] Urban Legends Reference Pages: Compound Interest, http://www.snopes.com/quotes/einstein/interest.asp (last visited Aug. 22, 2007). Einstein is quoted or paraphrased in many books on personal and business finance, but, according to a web site devoted to debunking rumors, his statement about compound interest is probably an urban legend. *See id.*; *see also* Michael J. Copps, *America's Internet Disconnect*, WASH. POST, Nov. 8, 2006, at A27 (attributing the same phrase to Albert Einstein).

[2] *See infra*, Part V. *See generally* R.F. Lanzillotti & A.K. Esquibel, *Measuring Damages in Commercial Litigation: Present Value of Lost Opportunities*, J. ACCT., AUDITING & FIN. Winter 1990, at 125, 125 (discussing the methods for measuring damage awards in commercial litigation).

[3] *See, e.g.*, Craig A. Jacobson, *The Use of Empirical Data to Estimate Discount Rates for Business Valuation and/or*

difference will be huge. It may even make the difference between a multi-million dollar recovery and no recovery at all.[4] In one antitrust case, the court observed that if it applied the discount rate advocated by the defendant, the damages would be $60 million less than if the plaintiff's proposed rate were used.[5] Using Solomon's technique, but perhaps not his wisdom, the court split the difference.[6]

Most judges will not even do that much. They state that determining the discount rate is a question of fact to be decided by the trier of fact, and they give the competing experts free rein to use any discount rates that the expert chooses.[7] Such practice simply indulges the fantasy that average lay jurors can understand calculations that baffle most lawyers and judges. As a result, a confusing, inconsistent, and unfair body of law has emerged.[8] One article notes, "[a] striking aspect of the judgments is their lack of consistency in applying basic principles of economics and finance."[9]

Economic Damages Analysis, INSIGHTS 3, 3 (2006) ("a small change in the discount rate can often have a significant impact on . . . a lost profits calculation"); Lanzillotti & Esquibel, *supra* note 2, at 132 (demonstrating sensitivity of recovery to discount rate applied in Table 1); *cf.* John Yozzo & Randall S. Eisenberg, *Rethinking WACC in Estimating Reorganization Value*, 22-6 AM. BANKR. INST. J. 38, 38 (2003) ("The acute sensitivity of net present value (NPV) to relatively small changes in [the discount rate] allows for bias to be insinuated into the valuation process through subtle adjustments to [the discount rate].").

In one reported case, the defendant argued that by using too low a rate to discount future income, an arbitrator effectively awarded punitive damages in violation of governing law. *See* Bridas S.A.P.I.C. v. Turkmenistan, 345 F.3d 347, 365 (5th Cir. 2003) ("Thus, because there was no explicit award of punitive damages and the discount rate, a device used for setting compensatory damages, was not selected in manifest disregard of the law, we reject Turkmeneft's argument that the arbitor awarded punitive damages."). While this argument lost, the fact that a large, highly-respected global law firm was willing to make the argument before a United States Court of Appeals shows the effect of the discount rate on a damage award.

[4] *See, e.g.*, Fishman v. Estate of Wirtz, 807 F.2d 520, 579 (7th Cir. 1986) ("Changing the estimates [of metrics on which discount rates based] by even a few percentage points will double or wipe out the damages.") (Easterbrook, J., dissenting).

[5] So. Pac. Comm. Co. v. AT&T, 556 F. Supp. 825, 1087 (D.D.C. 1982).

[6] *Id.*

[7] *See* Pennell v. Keene Bros. Trucking, Inc., 589 So. 2d 965, 967 (Fla. Dist. Ct. App. 1991), *quashed and remanded on other grounds*, 614 So. 2d 1083 (Fla. 1993) (noting that the court granted a new trial because a juror who was himself a CPA took an accounting book into the jury room and referred to it in order to calculate the present value of future damages).

[8] *See* Lanzillotti & Esquibel, *supra* note 2, at 125 (noting "a hodge-podge of approaches and theories").

[9] *Id.*

This article attempts to improve the understanding of principles used to discount lost profits. Part II of this article presents the three analytical tools that lawyers and judges need to understand to work in this area. These tools are: (1) discounting to present value, (2) expected value analysis, and (3) economic risk. The last segment of Part II is particularly important because many of the problems in discounting lost profits occur when lawyers and judges fail to understand the technical meaning that economists and financial analysts give the common term "risk." Part III presents two concepts to which discounting lost profits is often analogized–enterprise valuation and discounting the lost earnings of an individual. This part explains why the principles of enterprise valuation can properly be used when discounting lost profits and why the principles of discounting individual earnings cannot be used to discount lost profits, even though on a superficial level the latter seems a closer analogy. Part IV explains why the plaintiff's weighted average cost of capital (a finance metric commonly known as "WACC") is the most appropriate discount rate to use when discounting lost profits to present value in most cases. Part V discusses the case law in this area, which to my knowledge, has never before been thoroughly analyzed. In this analysis, the lack of attention that lawyers and judges have given this issue becomes obvious. Economically sophisticated judges, such as Richard Posner and the judges on specialized courts like the Tax Court and the Court of Federal Claims, usually get it right, but juries and generalist judges who do not deal with complex economic cases on a daily basis are often bamboozled by expert witnesses.[10] Part VI urges judges to take action to prevent this from happening.

II. THE ANALYTICAL TOOLS

The discussion that follows necessarily involves a little math. I have tried to make it as straightforward as possible so that readers who remember little from middle school math can still follow the explanation. I realize many readers are uncomfortable dealing with numbers, and this discomfort, often shared by lawyers and judges, enables expert witnesses to win cases with dubious analyses they would not dare present to their professional peers.

Any reader who has difficulty understanding the concepts discussed below should note that in many of the cases discussed later in this article, a court dismissed a challenge to an expert's choice of a discount rate with an assertion that the jury could determine for itself whether the discount rate was appropriate. Implicit in this is the assumption that the average juror, a person with much less education and intelligence than the average reader of this article, will understand these concepts. Moreover, the reader of this article has advantages unavailable to the juror. The reader can move through the material at his own pace and refer back to prior material, whereas the juror

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[10] Judge Posner has said that the purpose of *Daubert* is "to protect juries from being bamboozled by technical evidence of dubious merit." SmithKline Beecham Corp. v. Apotex Corp., 247 F. Supp. 2d 1011, 1042 (N.D. Ill. 2003) (Posner, Circuit Judge, sitting by designation).

must depend on an oral presentation in question and answer format by a witness who may be trying to obfuscate in order to conceal the weaknesses in his client's case.[11] Further, the typical reader is (I hope) motivated and alert, whereas the juror normally hears this material when he is already tired and bored from sitting through the liability phase of a long trial. With these considerations in mind, I will attempt to describe the necessary tools with the hope that readers will use these descriptions to understand the arguments and case analyses presented in the article and that courts will use them to make independent evaluations of the damage calculations presented by expert witnesses.

A. Discounting to Present Value

It is now accepted beyond argument that any award of damages for future profits must be discounted to present value to avoid overcompensating the plaintiff.[12] Because a dollar received today is more valuable than a dollar received at a later time, a plaintiff who receives a present award based on future profits will be overcompensated unless the award is discounted to present value.[13] Discounting to present value is one of the most basic concepts in finance.[14] This concept is the converse of compound interest, and, like compound interest, discounting to present value is based on the time value of money. The time value of money, in turn, is based on the idea that having a dollar today is more valuable than having a dollar a year from now, if only for the reason that a dollar acquired today can be invested at interest to yield more than a dollar a year from now.[15]

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[11] *See* Robert M. Lloyd, *Proving Lost Profits After* Daubert*: Five Questions Every Court Should Ask Before Admitting Expert Testimony*, 41 U. RICH. L. REV. 379, 385 (2007) (quoting speech by an expert witness explaining how he defeats cross-examination by making the explanations too difficult to understand).

[12] *See infra* Part V.A.

[13] *See, e.g.*, Franconia Assoc. v. United States, 61 Fed. Cl. 718, 763 (2004) ("To prevent unjust enrichment of the plaintiff, the damages that would have arisen after the date of judgment ("future lost profits") must be discounted to the date of judgment."); Citizens Fed. Bank, F.S.B. v. United States, 59 Fed. Cl. 507, 524 (2004) (dicta that post-judgment damages must be discounted to present value to avoid unjust enrichment); Denis Boudreaux, William Ferguson & Philip Boudreaux, *Analysis and Valuation of Closely Held Firms Involved in Business Damage Cases and Application of Certainty Equivalence*, J. LEG. ECON. Winter 1999-2000, at 1, 1-2. Systematic overcompensation of plaintiffs must be avoided not only for reasons of justice, but also because overcompensation provides potential plaintiffs with an incentive to invest too much in litigation and potential defendants an incentive to invest too much in litigation avoidance. Lanzillotti & Esquibel, *supra* note 2, at 129 n.6. When parties give in to these incentives, the practice wastes resources that society could better employ elsewhere. *Id.*

[14] *See, e.g.*, LaSalle Talman Bank, F.S.B. v. United States, 45 Fed. Cl. 64, 105 (1999), *vacated,* 317 F.3d 1363 (Fed. Cir. 2003) (discussing use of present value in investment and finance); ERIK BANKS, FINANCE: THE BASICS 65 (2007) (describing present value as "one of the most important tools of finance").

[15] *See, e.g.*, Jones & Laughlin Steel Corp. v. Pfeifer, 462 U.S. 523, 536 (1983) ("[E]ven in an inflation-free

Discounting to present value calculates the amount of money received today that would be the equivalent of a given amount received at a given time in the future.[16] For example, suppose that in a breach of contract case the court determines that but for the defendant's breach, the plaintiff would have received $100,000 one year from today. To determine what amount paid today would satisfy our goal of putting the plaintiff in the same position that performance would have, the court might determine that for $90,000 a person could purchase an investment that would pay $100,000 a year from now. From this, the court might conclude that $90,000 is the "present value" of $100,000 a year from now. (We will leave for later the difficult question of whether this benchmark investment should be a risk-free investment that would pay a relatively low rate of interest or a risky one that might pay considerably more.)[17]

Discounting is simply the process of determining the appropriate interest rate and then calculating the amount that would have to be invested today at that rate to produce the cash flow in question.[18] To illustrate, suppose that in our previous example we determine that the appropriate interest rate is 10%. (By convention, when using the interest rate to calculate backwards to determine how much a future payment would be

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economy the award of damages to replace the lost stream of income cannot be computed simply by totaling up the sum of the periodic payments. For the damages award is paid in a lump sum at the conclusion of the litigation, and when it–or even a part of it–is invested, it will earn additional money.").

[16] As an opinion of the United States Court of Appeals for the Federal Circuit put it:

> The DCF [discounted cash flow] method is currently in wide use in the analysis of capital stock, acquisition candidates, capital projects, financial instruments, and contract rights. The DCF method measures the value of a business by forecasting its anticipated net cash flow. Such cash flows are then discounted to present value to account for both: (i) the time value of money; and (ii) business and financial risks.

Energy Capital Corp. v. United States, 302 F.3d 1314, 1331 (Fed. Cir. 2002). The rigorous use of discounted cash flow has been traced back to ancient Babylon. PHILLIP R. DAVES, MICHAEL C. EHRHARDT & RONALD E. SHRIEVES, CORPORATE VALUATION: A GUIDE FOR MANAGERS AND INVESTORS 5 (Thompson South-Western 2004).

Although the concept of discounting for time value is most commonly used for monetary quantities, it is also used to value other costs and quantifiable benefits. *See, e.g.*, Tyler Cowen, *Caring About the Distant Future: Why It Matters and What It Means*, 74 U. CHI. L. REV. 5, 5 (2007). Where issues of public policy are concerned, the issue of the proper discount rate creates a wide variety of arguments. *Id.* at 5-12.

[17] *See infra* Part IV.B.

[18] *See* SHANNON P. PRATT, ROBERT F. REILLY & ROBERT P. SCHWEIHS, THE ANALYSIS AND APPRAISAL OF CLOSELY HELD COMPANIES 159 (4th ed. 2000) ("In economic terms, a present value discount rate is an 'opportunity cost,' that is, the expected rate of return … that an investor would have to give up by investing in the subject investment–instead of in available alternative investments that are comparable in terms of risk and other investment characteristics.").

worth in present income, the interest rate is called the *discount rate*.) The question then becomes "how much is the *present value* of $100,000 to be paid one year from today (we refer to the actual amount to be received in the future as the *future value*) given a discount rate of 10%." For simplicity, we will assume the interest will not be compounded. To make the calculation, we note that if the money is invested at 10%, every dollar will be repaid after a year with 10 cents interest, so the return on each dollar will be $1.10. Therefore, the number of dollars invested to produce a return of $100,000 is $100,000/$1.10 or $90,909.09.[19]

To calculate for longer periods, we note that if one dollar was invested at 10% for three years with annual compounding, it would be worth $1.10 after the first year. During the second year, the $1.10 would again accrue interest, and at the end of the second year it would be worth 1.10 times (i.e., 110% of) $1.10 or $1.21. In other words, the amount invested is multiplied by one plus the interest rate (expressed as a decimal), and the multiplication is repeated once for every year that the sum remains invested.[20] If the interest is compounded more often than annually, the $1.00 present value is multiplied by one plus *the interest rate per period*, and the process is repeated as many times as there are compounding periods.[21] For example, if $1.00 was invested at 10% per annum for three years with semi-annual compounding, the $1.00 present value would be multiplied by 1.05 (one plus the semi-annual interest rate of 5%) six times (the number of semi-annual periods).

This means that the future value of any sum is the present value (i.e., the value today) multiplied by one plus the interest rate per compounding period, multiplied by the number of compounding periods. This may be expressed mathematically as:

$$FV = PV(1 + i)^n$$

Where:

FV is the future value (the amount to be received at a specified time in the future),

PV is the present value (the amount presently invested),

i is the rate of interest per compounding period (expressed as a decimal), and

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[19] In the previous example in which a bond purchased for $90,000 yielded $100,000, the interest rate or the *yield* on the bond was 11.11%. This is higher than 10% because the income of $10,000 was produced by an investment of only $90,000.

[20] ROBERT W. HAMILTON & RICHARD A. BOOTH, BUSINESS BASICS FOR LAW STUDENTS: ESSENTIAL TERMS AND CONCEPTS § 1.3 (4th ed. 2006).

[21] *Id.*

n is the number of compounding periods.[22]

By solving this formula for the present value, we can determine the amount that must be invested today to have a specified amount at a specified time in the future. This formula is:

$$PV = FV/ (1+i)^n$$ [23]

This means that for any loss of future profits we can, *if we know the proper discount rate*, determine the amount necessary to be paid today to fully compensate, but not over-compensate, the plaintiff.

The table below shows the present value of the $100,000 in damages discounted for periods of one to five years at 10% with annual compounding.

Year	**Amount**	**Present Value at 10%**
1	$100,000.00	$90,909.09
2	$100,000.00	$82,644.63
3	$100,000.00	$75,131.48
4	$100,000.00	$68,301.35
5	$100,000.00	$62,092.13

If the plaintiff has been damaged by the loss of payments that would have been received at different times, the present value of the loss may be calculated by simply adding the present values of the individual payments. Thus, if the plaintiff lost profits of $200,000, half of which would have been received at the end of the second year and half of which would have been received at the end of the third year, the present value is $ 157,776.11. This amount is the sum of $82,644.63, the present value of $100,000 received after two years (see table above), and $75,131.48, the present value of $100,000 received after three years.

Although discounting is fairly straightforward, too many lawyers and judges fail to understand it.[24] In some cases, the lawyers and the trial judge completely overlook

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[22] *See, e.g.*, PRATT ET AL., *supra* note 18, at 156.

[23] *See* E. Minerals Int'l, Inc. v. United States, 39 Fed. Cl. 621, 629 (1997), *rev'd on other grounds sub nom* (stating the formula in a slightly altered form); Purina Mills, LLC v. Less, 295 F. Supp. 2d 1017, 1048 n.20 (N.D. Iowa 2003) (stating and applying the formula).

the question of discounting so that the appellate court is forced to raise the issue on its own.[25] More commonly, lawyers and judges give discounting little attention, so the jury simply picks one expert's number and gives the issue little thought.

B. Expected Value Analysis

The second analytical tool that lawyers and judges need to understand is expected value analysis. This tool is known by a variety of other names including expected monetary value analysis,[26] EMV analysis,[27] decision analysis,[28] and decision under risk.[29] Although it is rarely used in judicial decisions,[30] people in business and

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[24] This may be due to the fact that law school seems to attract people who are not comfortable with math. *See* MARY ANN GLENDON, A NATION UNDER LAWYERS: HOW THE CRISIS IN THE LEGAL PROFESSION IS TRANSFORMING AMERICAN SOCIETY 202 (1994) (discussing effect of elimination of math questions from LSAT).

[25] *See generally* Kenneth M. Kolaski & Mark Kuga, *Measuring Commercial Damages via Lost Profits or Loss of Business Value: Are These Measures Redundant or Distinguishable?*, 18 J. L & COM. 1, 10 (1998) ("[J]udges are former lawyers, and more specifically, generally, former litigators. Lawyers and judges often have liberal arts backgrounds as college undergraduates. In addition, law schools devote little time to finance, accounting and economic topics. Ultimately, this lack of finance, accounting, and economic sophistication may at times put judges in the awkward position of having to make Solomon-like pronouncements regarding complicated commercial damages issues.").

[26] *See, e.g.*, HOWARD RAIFFA, DECISION ANALYSIS: INTRODUCTORY LECTURES ON CHOICES UNDER UNCERTAINTY 8-9 (McGraw Hill 1968).

[27] *See, e.g.*, *id.* The word "monetary" in the name indicates that this variation of the analysis assumes the subject has a linear utility function for money, i.e., that gaining $100,000 is one hundred times as good as gaining $1,000. *Id.* at 9. This assumption is valid where the actor is rational and the amounts involved are small in comparison to the actor's total wealth. *Id.*

[28] *See, e.g.*, REX V. BROWN, ANDREW S. KAHN & CAMERON PETERSON, DECISION ANALYSIS FOR THE MANAGER 609 (1974).

[29] *See, e.g.*, *Pascal's Wager*, *in* STANFORD ENCYCLOPEDIA OF PHILOSOPHY (2004), *available at* http://plato.stanford.edu/entries/pascal-wager (explaining that "the agent assigns subjective probabilities to the various states of the world").

[30] *See* Joseph H. King, Jr., *Causation, Valuation and Chance in Personal Injury Torts Involving Preexisting Conditions and Future Consequences*, 90 YALE L.J. 1353, 1376-81 (1981) (discussing limited situations in which the method is applied). Although courts have been slow to adopt decision analysis, many legal scholars use it in their arguments and analysis. *See, e.g.,* Jonathan R. Macey, *Packaged Preferences and the Institutional Transformation of Interests,* 61 U. CHI. L. REV. 1443, 1454 (1994) (using expected value analysis to explain an investment decision); Robert J. Rhee, *The Effect of Risk on Legal Valuation*, 78 U. COLO. L. REV. 193 (2007) ("[L]aw and economics scholarship has subscribed to the conventional wisdom that the value of a legal dispute is its expected value. . . .").

finance use this concept extensively.[31] Expected value analysis gives decision makers a way to make rational, quantifiable decisions when facing uncertain outcomes.[32] Robert Rubin, the Wall Street leader who became a spectacularly successful Treasury Secretary in the Clinton Administration, describes in his autobiography how this mode of thinking changed his life:

> What has guided my career in both business and government is my fundamental view that nothing is provably certain. One corollary of this view is probabilistic decision making. Probabilistic thinking isn't just an intellectual construct for me, but a habit and discipline deeply rooted in my psyche. . . . My life on Wall Street was based on probabilistic decisions I made on a daily basis.[33]

This view is so much a part of his life that Rubin titled his autobiography *In An Uncertain World*.[34]

The basic theory of expected value analysis is quite simple: you assign monetary values to various choices or chances by multiplying the monetary value of each potential outcome (i.e., the amount that will be won or lost if the outcome occurs) by the probability that this outcome will occur.[35] To take a simple example, suppose you are told that a fair coin will be flipped and that you will be paid one dollar if the coin lands heads. The value of this chance is 50 cents–the value of the payoff ($1.00) multiplied by the probability that the payoff will occur (.50).[36] Similarly, if you will be paid $1.00 if a

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[31] *See* BROWN ET AL., *supra* note 28, at 5 ("Since the mid-1960s, there has been a dramatic burgeoning of efforts by major corporations to adapt [expected value analysis] to their day-to-day decision-making, especially at the most senior level, for example, for acquisitions and new product launchings.").

[32] *See* IAN HACKING, THE EMERGENCE OF PROBABILITY: A PHILOSOPHICAL STUDY OF EARLY IDEAS ABOUT PROBABILITY, INDUCTION, AND STATISTICAL INFERENCE 64 (1975) ("Decision theory is the theory of deciding what to do when it is uncertain what will happen."); *see, e.g.*, BROWN ET AL., *supra* note 28, at 5 ("Decision analysis is a technology that assists individuals and organizations to make up their minds . . . .").

[33] ROBERT L. RUBIN & JACOB WEISBERG, IN AN UNCERTAIN WORLD 7 (Random House 2003).

[34] *See id.* at x-xii.

[35] *See, e.g.*, BROWN ET AL., *supra* note 28, at 11 (providing an example of expected value analysis); WILLIAM A. CHANCE, STATISTICAL METHODS FOR DECISION MAKING 78 (1969); LOUIS KAPLOW & STEVEN SHAVELL, DECISION ANALYSIS, GAME THEORY, AND INFORMATION 10 (Fountain Press 2004) ("The natural choice would seem to be the *expected value*, which is the probability of the payoff multiplied by the amount of the payoff."); RAIFFA, *supra* note 26, at 8-9; King, *supra* note 30, at 1384 (advocating application of this principle to tort damages); Yozzo & Eisenberg, *supra* note 3, at 38 (applying this principle to the valuation of a reorganizing business).

[36] *See Pascal's Wager*, *supra* note 29 (articulating a similar example with a payoff of $3.00).

fair die comes up six, then the value of the chance would be 16.67 cents–$1.00 multiplied by the chance of rolling six on a fair die (0.1667[37]).

It is exactly this analysis that enables casinos to operate so profitably. In Nevada roulette, for example, there are 38 numbers on which the ball can land (1-36, 0, and 00).[38] The chances of the ball landing on any one of them is equal, so the probability of the ball landing on a particular number is 1/38 or .026316.[39] For each dollar bet on a particular number, the payoff if the ball lands on that number is $36.00.[40] This means that the *expected value* (the term used to describe the value of a chance) of a dollar bet on a single number in roulette is .026316 (the chance of the payoff) times $36.00 (the amount of the payoff,) or $0.947368. In other words, for every dollar bet, the gambler is making a "donation" of 5.2632 cents to the house.

This description of decision science intentionally began, as do most elementary descriptions, with a discussion of gambling. Enlightenment-era gamblers, many of whom were also distinguished mathematicians, scientists, philosophers, and men of letters, invented decision science in an effort to gain an advantage over their opponents.[41] One scholar says that the science actually began when Blaise Pascal solved a problem that had intrigued and confounded mathematicians for 200 years–how to equitably distribute the pot when a game of chance was terminated prematurely.[42] Another of Pascal's insights, that which is commonly known as "Pascal's Wager," can be thought of as the ultimate application of expected value analysis–a problem in which the difference in outcomes is so great that it dominates any possible difference in the probabilities.[43]

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[37] This result is rounded to four decimal places. The exact chance is .16666666. . . .

[38] DAVID FREEDMAN, ROBERT PISANI & ROGER PURVES, STATISTICS 281 (3d ed. 1998); *see Roulette,* 23 ENCYCLOPEDIA AMERICANA 808 (2006) (describing American roulette).

[39] European roulette has no double zero, but the payoff is still $36. *See* William R. Eadington, *The Economics of Casino Gambling*, 13 J. ECON. PERSP. 173, 185 (noting that because European Roulette has 37 outcomes, American Roulette is more expensive to play than its European counterpart). Therefore the chance of winning in European Roulette is 1/37. This means that the expected loss for each dollar bet is only 2.0727 cents.

[40] FREEDMAN ET AL., *supra* note 38, at 283.

[41] *See* PETER L. BERNSTEIN, AGAINST THE GODS: THE REMARKABLE STORY OF RISK 39-56 (1996) (describing the role of "Renaissance Gamblers" in the development of the theory of probability).

[42] Hacking, *supra* note 32, at 62.

[43] BERNSTEIN, *supra* note 41, at 69-70. Pascal stated it as follows:

> Let us see. Since there is an equal risk of gain or loss, if you had only to gain two

But, expected value analysis would be of little interest if it were only useful for gambling. It has become a foundation of business decision making. Expected value analysis is used for making such diverse decisions as what proportion of an investment portfolio should be stocks and what proportion should be bonds,[44] whether a wildcatter should drill an oil well in a particular location,[45] whether an attorney should hire an expert witness,[46] whether an arbitrageur should buy the stock of a merger candidate,[47] or whether a real estate investor should test a parcel of land for hazardous wastes.[48]

C. Risk

Even though many lawyers and judges do not understand the mechanics of discounting to present value, it is not the mechanics that cause the problems. The mechanics are almost invariably done right. The problem comes with the choice of the discount rate. Reasonable experts can differ, at least within certain limits, on this issue.[49] The problem occurs when experts go far beyond those limits *and get away with it* because lawyers and judges do not understand the economic principles involved. These principles center on the concept of risk.

When economists and other financial experts use the term "risk," they use it in a way that is quite different from the way most people, including most lawyers, use it. To most of us, risk is the possibility of an adverse outcome. To the financial expert, however, risk has a quite different meaning. It does not measure only the chance of an

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> lives, instead of one, you might still wager. But if there were three lives to gain, you would have to play (since you are under the necessity of playing), and you would be imprudent, when you are forced to play, not to chance your life to gain three at a game where there is an equal risk of loss and gain. But there is an eternity of life and happiness.

Pascal's Wager, *supra* note 29. Scholars have noted that Pascal's analysis seems to assume that there is a 50-50 chance God exists and that there is no diminishing return with the number of lives one has, i.e., three lives is three times as good as one life. *Id.*

[44] *See, e.g.*, Stephen J. Brown & Mark P. Kritzman, *Quantitative Methods in Asset Allocation*, *in* QUANTITATIVE METHODS FOR FINANCIAL ANALYSIS 167-69 (Stephen J. Brown & Mark P. Kritzman, eds., 2d ed. 1990).

[45] *See, e.g.*, RAIFFA, *supra* note 26, at 34-36.

[46] *See* KAPLOW & SHAVELL, *supra* note 35, at 36-42.

[47] RUBIN & WEISBERG, *supra* note 33, at 44.

[48] KAPLOW & SHAVELL, *supra* note 35, at 16-22.

[49] *See infra* notes 327-328 and accompanying text.

adverse outcome; it measures the deviations of all potential outcomes from the expected value.[50] This includes favorable deviations, as well as unfavorable ones.[51]

One finance textbook defines "risk" as the likelihood that the actual outcome will be close to the expected value: "[t]he tighter the probability distribution of future returns, the smaller the risk of a given investment."[52] Financial analysts often use the standard deviation of the set of potential outcomes as a quantitative measure of risk.[53]

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[50] *See, e.g.*, ARI KIEV, THE PSYCHOLOGY OF RISK: MASTERING MARKET UNCERTAINTY 13 (Wiley 2002) (defining risk as a measure of potential changes in value); PRATT ET AL., *supra* note 18, at 161 ("In the context of cost of capital, we define *risk* as *the degree of uncertainty as to the realization of the expected future returns.*) (emphasis in original); Laura J. Boothman, Gaurav Jetley & Robert Noah, *Estimating the Cost of Capital*, *in* LITIGATION SERVICES HANDBOOK: THE ROLE OF THE FINANCIAL EXPERT § 8.1 (Roman S. Weil et al., eds. 2001); Mark Klock, *Financial Options, Real Options and Legal Options: Opting to Exploit Ourselves and What We Can Do About It*, 55 ALA. L. REV. 63, 66 (2003) (increase in risk increases chances of large movements, favorable or unfavorable); James J. Meyer, Patrick Fitzgerald & Mostafa Moini, *Loss of Business Profits, Risk and the Appropriate Discount Rate,* 4 J. LEG. ECON. 27 (Winter 1994) ("the asset's risk is measured by the dispersion of returns that it generates around its expected return"); Lynn A. Stout, *Why the Law Hates Speculators: Regulation and Private Ordering in the Market for OTC Derivatives*, 48 DUKE L.J. 701, 735 (1999) ("In economic parlance, 'risk' refers to the probabilistic variation in wealth: chances of gains, as well as of losses."); Rhee, *supra* note 30, at 97 (risk is "the measure of variance from expectation"); *Pascal's Wager*, *supra* note 29.

Some writers differentiate between "risk" and "uncertainty." These writers limit "risk" to situations where the probabilities are known, such as in a fair coin toss or a fair game of roulette. *Pascal's Wager*, *supra* note 29. "Uncertainty" is used to describe situations where the probabilities are not known, such as the potential success of a bio-tech start-up. *Id.* Frank Knight, an early member of the Chicago School, appears to have first made this distinction. *See* FRANK H. KNIGHT, RISK, UNCERTAINTY AND PROFIT 233-34 (Harper Torchbooks 1921). This article will not adhere to that distinction.

[51] In this context, there is no "risk" that you are going to die. You are certain to die eventually, and risk only measures uncertainty. There is, of course, considerable risk involved in your life span. You have a certain life expectancy, and the number of years you actually live may be many more or many less than that life expectancy. Life insurance companies devote considerable resources to calculating this risk and dealing with it.

[52] EUGENE F. BRIGHAM & PHILIP R. DAVES, INTERMEDIATE FINANCIAL MANAGEMENT 24 (7th ed. 2002). It is for this reason that risk *increases* the value of an option. *See* Klock, *supra* note 50, at 69 ("risk raises value for an option, especially when the option is right at the money"). Consider an option to purchase shares of a stock at $60 that is presently selling for $55 per share. If the stock is a low-risk stock (i.e., its price varies little), the option has a relatively small value because there is little likelihood that the price of the stock will go much above the $60 "strike price." If, however, the stock is very risky (i.e., its price is subject to substantial variations) the option is much more valuable because it is more likely that the value of the stock will go well above the strike price. The complex formula for pricing an option is set out at PETER L. BERNSTEIN, CAPITAL IDEAS: THE IMPROBABLE ORIGINS OF MODERN WALL STREET (hereinafter: BERNSTEIN, CAPITAL IDEAS) 228 (1992). Chapter 11 of Bernstein's book gives the story of the formula's development.

[53] *See, e.g.*, BANKS, *supra* note 14, at 49 (defining standard deviation as a common measure of risk);

In non-mathematical terms, risk can be thought of as volatility. In fact, some works on finance use "variability" and "volatility" as synonyms for "risk."[54]

As an example of risk in this sense, consider a game of roulette. Is there risk in roulette? It depends on how many bets you make. If you make only one large bet, there is a lot of risk, but if you make a large number of equal-size bets, there is very little risk. In the latter case, there is a large probability that you will go home with less money than you came with. But that is different from "risk" as economists use the term. If you make a single bet of $100 on red, the expected value of that bet is $94.74.[55] The standard deviation, a common measure of risk, is $99.86.[56] There is a 47.4% chance you will go home $100 richer, and a 52.6% chance you will go home $100 poorer. On the other hand, if you make 100 bets of $1 each, the expected value is the same, but the standard deviation is $9.87, only one-tenth of the standard deviation of the single large bet.[57] There is roughly a two-thirds chance that you will end the night somewhere

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EDWARD W. DAVIS & JOHN POINDEXTER, FINANCE AND THE FIRM 78-85 (Oxford University Press 1984) (explaining that the standard deviation can be used to evaluate risk). The standard deviation is calculated by (i) squaring the difference between each potential outcome and the expected value, (ii) weighting each of the squares by the probability of the outcome, and (iii) taking the square root of the sum. *See* BANKS, *supra* note 14, at 49. For example, the expected value of a coin toss where tails has a value of 0 and heads a value of one is 0.50. The standard deviation is:

$\sqrt{[0.5(0.0-0.5)^2 + 0.5(1.0-0.5)^2]} = 0.50.$

In some circumstances, it is more appropriate to use the coefficient of variation, which is the standard deviation of the potential returns divided by the expected value of the returns. *See* BRIGHAM & DAVES, *supra* note 52, at 27-28 (providing the formula for the coefficient of variation).

[54] *See, e.g.*, BERNSTEIN, CAPITAL IDEAS, *supra* note 52, at 51 (equating variability with risk); RICHARD A. BREALEY, STEWART C. MYERS & FRANKLIN ALLEN, PRINCIPLES OF CORPORATE FINANCE 556 (8th ed. 2006) (equating volatility with risk); *see also* Celebrity Cruises Inc. v. Essef Corp., 478 F. Supp. 2d 440, 452 (S.D.N.Y. 2007) (equating volatility with risk); BANKS, *supra* note 14, at 58 (equating volatility with standard deviation in context of earnings).

[55] The expected value is the sum the potential payoffs, each multiplied by the probability of that payoff occurring. *See supra* text accompanying notes 35-37. On an American roulette wheel, there are 18 red slots, 18 black slots, and two slots (0 and 00) which are neither red nor black. *Roulette*, *supra* note 38, at 808. Each dollar bet on red returns $2 if the ball comes to rest in one of the red slots and nothing if it comes to rest in one of the other 20. Thus, the expected value of a one dollar bet is $2 x (18/38) plus $0 x (20/38) or $0.9474. Thus, a $100 bet has an expected value of $94.74.

[56] The standard deviation is the square root of the average of the squares of the differences of between the potential outcomes and the expected value. *See supra*, text accompanying note 53. The formula in this case is:

$SD = \sqrt{[(18[\$200-\$94.74]^2 + 20\ [\$0 - \$94.74]^2)/38]}$

[57] The standard deviation for a series of trials is the standard deviation of a single trial multiplied by the

between $5 ahead and $15 behind.[58] There is only about one chance in 40 that you will lose more than $25 or win more than $15.[59]

One of the guiding principles of financial economics[60] is that rational economic actors will not accept economic risk unless they are compensated for it.[61] In other words, a rational person will choose a sure $100 over a chance that has an expected value of $100. As an example, consider a lawyer who normally bills at $200 an hour. The lawyer has been asked to undertake a representation in which there is only an 80% probability that she will be able to collect her fee. (For simplicity, we will assume the lawyer normally collects 100% of her billings.) To have an expected value of $200 per hour on this representation, the lawyer needs to bill $250 per hour. But, the $250 an hour rate does not compensate her for the risk as we have been using that term. Because a sure $200 an hour is more valuable to her than an 80% chance of getting $250 per hour, she needs additional compensation to make the deal as good as what she normally gets. How much this additional compensation has to be depends on how risk averse the lawyer is. If her finances are precarious and not getting paid on this representation would cause her financial distress–causing her to have to borrow at high rates or perhaps even default on some obligations and suffer professional embarrassment–then she should undertake the representation only if she can bill a large amount (a "risk premium") over the $250 an hour she needs to have a $200 an hour expected value. On the other hand, if she has a large amount of ready cash she can use

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square root of the number of trials. *See* FREEDMAN ET AL., *supra* note 38, at 291 (providing example of the standard deviation for multiple draws). The standard deviation of a one dollar bet on red is 1/100 of the standard deviation of a $100 bet, and the standard deviation of 100 one dollar bets is ten times the standard deviation of a single one dollar bet. Where a series of random events (such as spins of a roulette wheel are being evaluated) the parameter is sometimes called the standard error instead of the standard deviation. *See id.* at 291 (noting that the standard deviation and standard error are different concepts, but are often used to describe the same thing). This article will not make that distinction.

[58] These amounts are approximately one standard deviation each side of the expected value. For a normal distribution, which we would have assuming the roulette wheel is not rigged or otherwise defective, approximately two-thirds of all outcomes are within one standard deviation of the mean. *See id.* at 79 (providing a histogram chart of the normal curve to demonstrate standard deviation).

[59] These amounts are about two standard deviations from the expected value. Approximately 95% of all outcomes in a normal distribution are within two standard deviations of the mean. *Id* at 81.

[60] Financial economics is the branch of economic theory which studies the effect of risk on investment and financial decisions. Robert J. Rhee, *Application of Finance Theory to Increased Risk Harms in Toxic Tort Litigation*, 42 VA. ENVTL. L. J. 111, 120 (2004).

[61] *See* Price v. Marshall Erdman & Assoc., 966 F.2d 320, 327 (7th Cir. 1992) (Posner, J.) ("most people are assumed to be risk-averse in their serious financial affairs"); BREALEY ET AL., *supra* note 54, at 145 (investors "require a higher expected return from risky investments"); BRIGHAM & DAVES, *supra* note 52, at 29 (risk aversion is a well-documented fact and is presumed); RAIFFA, *supra* note 26, at 68 ("in serious business matters, most individuals are risk-averse").

to cover the shortfall if she cannot collect, then the risk premium will be much less. She should still charge more than $250 an hour, but the premium over $250 need not be nearly as great as it would have to be if the adverse consequences of not being paid were greater.

As I will explain later, the same principles apply to any investment.[62] An investment with low volatility is preferable to an investment with high volatility and the same expected return. Thus, a rational investor given the choice between a low-volatility investment and a high-volatility investment will choose the low-volatility investment unless the expected return on the high-volatility investment is great enough to compensate the investor for the difference in volatility (risk). We will also see that financial economists have developed tools for determining the amount of the risk premium and that these tools are in general use throughout the investment community and among experts who value businesses.[63] These tools are crucial in determining discount rates in lost profits litigation because a court judgment for lost profits has the effect of substituting a sure payment for volatile future profits.

III. TWO ANALOGOUS CONCEPTS: ENTERPRISE VALUATION AND LOST EARNINGS OF AN INDIVIDUAL

Technically, enterprise valuation, which involves determining the value of an ongoing business, is a separate issue from determining the value of lost profits. Nevertheless, the same economic principles govern both of these valuation exercises. Unfortunately, some courts have failed to realize this, and the result has been some indefensible holdings.[64]

Analyzing the lost earnings of a salaried or wage-earning individual presents exactly the opposite situation of analyzing lost profits for businesses. In theory, analyzing the lost earning of an individual is similar to the analysis of lost business profits, but courts and legislatures have created special rules to simplify the calculations in cases involving individuals.[65] These simplifying rules do not work in business cases, and they were never intended to apply in business cases. However, a few courts have unthinkingly applied them in business cases, leading to similarly indefensible holdings.[66]

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[62] *See infra* Part IV.A.

[63] *See id.*

[64] *See infra* Part V.B.

[65] *See* Jones & Laughlin Steel Co. v. Pfeifer, 462 U.S. 523, 548 (1983) (permitting simplifying rules because "[t]he average accident trial should not be turned into a seminar on economic forecasting").

[66] *See, e.g.*, Diesel Mach., Inc. v. B.R. Lee Indus., Inc., 418 F.3d 820 (8th Cir. 2005). In *Diesel Machinery*, the Eighth Circuit upheld the district court's decision to strike the testimony of a financial expert who testified that the proper rate at which to discount the plaintiff's future profits was 17.5%. The decision to strike

For these reasons, we will take a short excursion to discuss enterprise valuation and the discounting of individual earnings.

A. Enterprise Valuation

Financial experts are frequently called upon to determine the value of an ongoing business enterprise. This may be done in litigation involving such things as bankruptcy,[67] taxation,[68] marital dissolution,[69] or determination of shareholder rights.[70] Similarly, financial experts are often called upon to value businesses in non-litigation contexts.[71]

There are three basic approaches to valuation: the income approach, the market approach, and the asset approach.[72] An expert determining the value of a business normally uses all three approaches, but the income approach is the most important and is usually given the most weight.[73] It is also the approach relevant to the issues discussed in the remainder of this article. When using the income approach, the expert estimates the expected values of the future cash flows of the business and discounts the expected values to present value.[74] The income approach is based on what one treatise

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the testimony was based on a South Dakota pattern jury instruction, which was in turn based on a car wreck case. *Id.* The Eighth Circuit justified its decision saying: "There is a difference between discounting to present value damages awarded in a lawsuit, and discounting to present value the value of a business based on a future stream of lost profits." *Id.* at 837. The court cited no authority for this proposition, and it could because there is none. All of the other judicial, professional, and academic authorities are to the contrary. *See infra* notes 132-33 and accompanying text.

[67] *See, e.g.*, In re Med Diversified, Inc., 334 B.R. 89 (E.D.N.Y. 2005); Lippe v. Bairnco Corp., 288 B.R. 678 (S.D.N.Y. 2003).

[68] *See, e.g.*, Estate of Deputy v. Comm'r, 85 T.C.M. (CCH) 1497 (2003); Estate of Dunn v. Comm'r, 79 T.C.M. (CCH) 1337 (2000); Estate of Hendrickson v. Comm'r, 78 T.C.M. (CCH) 322 (1999).

[69] *See, e.g.*, Boudreaux et al., *supra* note 13, at 2.

[70] *See, e.g.*, PRATT ET AL., *supra* note 18, at 747-88.

[71] *See, e.g.*, *id.* at 21-22.

[72] JEFFREY M. RISIUS, BUSINESS VALUATION: A PRIMER FOR THE LEGAL PROFESSIONAL 65 (2007).

[73] *See* Frymire-Brinati v. KPMG Peat Marwick, 2 F.3d 183, 186 (7th Cir. 1993) (discounted cash flow is "the methodology that experts in valuation find essential"); Lippe v. Bairnco Corp., 288 B.R. 678, 689 (S.D.N.Y. 2003) ("the most reliable method for determining the value of a business is the discounted cash flow ("DCF") method"); *Estate of Dunn*, 79 T.C.M. (CCH) at 1340 ("It is well established that, as a general rule, earnings are a better criterion of value for operating companies and net assets a better criterion of value for holding or investment companies.").

[74] *See* PRATT ET AL., *supra* note 18, at 151-202; Boudreaux et al., *supra* note 13, at 8.

on business valuation describes as "one of corporate finance's most fundamental notions," the premise that "[t]he value of an asset (or bundle of assets) today is equal to the present value of the future cash flows expected to be provided by the asset over its economic life."[75] Thus, "the value of an enterprise today is the sum of the various future (but uncertain) cash flows to be generated of the entity's operations, discounted at some rate that reflects the riskiness (or uncertainty) of the cash flows."[76]

There are two basic methods of calculating the value of a business under the income approach. The most straightforward is the discounted cash flow method or DCF method.[77] This method consists of estimating the expected values of the income that the business will produce in future years and using a discount rate appropriate to

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[75] KENNETH R. FERRIS & BARBARA S. PÈCHEROT PETITT, VALUATION: AVOIDING THE WINNER'S CURSE 74 (2002); *see also* Energy Capital Corp. v. United States, 302 F.3d 1314, 1331 (Fed. Cir. 2002) ("The DCF method is currently in wide use in the analysis of capital stock, acquisition candidates, capital projects, financial instruments, and contract rights. The DCF method measures the value of a business by forecasting its anticipated net cash flow. Such cash flows are then discounted to present value to account for both: (i) the time value of money; and (ii) business and financial risks."); Beverly Hills Concepts, Inc. v. Schatz & Schatz, 717 A.2d 724, 734 (Conn. 1998) (value of a business is equal to sum of its future cash flows).

[76] FERRIS & PETTIT, *supra* note 75, at 74; *see also* Energy Capital Corp., 302 F.3d at 1331 n.6 (accepting expert testimony that value of venture is future cash flows discounted by risk-adjusted rate); PRATT, ET AL., *supra* note 18, at 154 ("regardless of what valuation approach is used, . . . the results should be compatible with what would result if a well-supported discounted economic income analysis were carried out"); RUBIN & WEISBERG, *supra* note 33, at 68 ("A stock, whether in a steel plant or a high-tech firm, is worth the present value of the company's expected future earnings, adjusted for risk and for other fundamental factors such as hidden assets on the balance sheet."); Boothman et al., *supra* note 50, § 8.1 ("The value of a project, a company, or an investment equals its future cash flows discounted to the present."); Steven N. Kaplan & Richard S. Ruback, *The Valuation of Cash Flow Forecasts: An Empirical Analysis,* 50 J. FIN., 1059, 1059 (1995) ("Most economists readily accept the concept of estimating market values by calculating the discounted value of the relevant cash flows."); Moonchul Kim & Jay R. Ritter, *Valuing IPOs*, 53 J. FIN. ECON. 409, 412 (1999) ("the DFC approach [to enterprise valuation] is based on a firmer theoretical footing than any other approach"); Kolaski & Kuga, *supra* note 25, at 12 ("The value of a business, or any asset for that matter, is generally considered to be the net present value of all future benefits (i.e., cash flows) that the owner may expect to derive from it"); Erik Lie & Heidi J. Lie, *Multiples Used to Estimate Corporate Value*, FIN. ANAL. J. 1, 44 (Mar./Apr. 2002) ("In theory, the valuation of a company is a straightforward matter accomplished via the DCF method. DCF analysis involves estimating the cash flows associated with the company and then discounting those cash flows by a discount rate commensurate with their risk level.").

[77] Some authorities refer to this method as the "discounted economic income method." *See, e.g.*, PRATT ET AL., *supra* note 18, at 154. This is probably a better name because it is not always cash flow that is discounted to determine value. A variety of metrics of economic income are used in this method. *See id.* at 154, 156. This article will use the term "discounted cash flow method" and "DCF method" because they are the terms most commonly used in judicial opinions.

the risk involved to discount those expected future values to a single present value.[78] Although the method is simple in theory, its application is difficult because the analyst must estimate individually the income in each future year and discount that year's income by an appropriate rate.

The second income-based method, the capitalization method, does not rely on attempts to estimate separately the expected value of the firm's income in each of the future years.[79] Instead, the analyst uses the earnings for a single year, typically the year following the year in which the valuation is being made, along with the discount rate as a basis for the firm's value.[80]

Mathematically, it can be shown that the present value of an infinite and constant stream of earnings equals the expected annual earnings divided by a discount rate.[81] This is often expressed by the equation:

$$PV = E/k$$

Where:

PV is the present value of the future income,

E is the expected annual income,[82] and

k is the discount rate.

It can also be shown that, when the annual earnings are expected to grow at a constant rate, the present value of the expected income equals the expected value of the earnings in the year following the valuation divided by the difference between the discount rate and the expected rate of earnings growth. The equation then becomes:

$$PV = E_1/(k-g)$$

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[78] *See, e.g.*, PRATT ET AL., *supra* note 18, at 152-59; RISIUS, *supra* note 72, at 72-74.

[79] *Id.* Other names for it include the capitalized cash flow method (see RISIUS, *supra* note 72, at 67), the single-period model (see *id.*), and the capitalized future economic income method (see PRATT ET AL., *supra* note 18, at 203).

[80] *See* PRATT ET AL., *supra* note 18, at 207-08 (providing formulas to use when discounting a capitalization rate through the constant growth model).

[81] *See, e.g.*, JOHN D. AYER, GUIDE TO FINANCE FOR LAWYERS § 9.02[B] (LEXIS 2001); PRATT ET AL., *supra* note 18, at 205.

[82] With appropriate adjustments, the formula can be applied over any period, for example, a quarter or a month, but for simplicity I will assume it is being applied on an annual basis.

Where:

PV is the present value of the future income,

E_1 is the expected income for the year following the valuation,

k is the discount rate, and

g is the expected rate of income growth.

If we then define the "capitalization rate" as the difference between the discount rate and the expected rate of income growth (k-g), the formula becomes:

$$PV = E_1/c$$

Where:

PV is the present value of the future income,

E_1 is the expected income for the year following the valuation, and

c is the capitalization rate.

The formula assumes that the income goes on forever. And of course, no business generates income forever.[83] This limits the method's usefulness, but the limitation is smaller than it initially appears. The capitalization method is most often used for valuing small businesses and other businesses where the risk (and therefore the capitalization rate) is high.[84] In this situation, the present value of later years' income declines rapidly.[85] At the same time, the values used for the income, the risk-adjusted discount rate, and the rate of growth will normally be subject to considerable uncertainty. In comparison with these uncertainties, the error introduced by the assumption of perpetual income will be relatively small. In fact, the apparent crudity of the capitalization method is one of its strengths. When the values being used are

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[83] *See* PETER L. BERNSTEIN, CAPITAL IDEAS EVOLVING 74 (MacMillan 2007) (researchers could find only forty-nine publicly-traded companies in continuous existence from 1926 through 2001). For an example of a sophisticated model using the assumption of perpetual earnings, see Celebrity Cruises Inc. v. Essef Corp., 478 F. Supp. 2d 440, 452 (S.D.N.Y. 2007) (economic expert projected plaintiff's cash flow in perpetuity).

[84] *See* PRATT ET AL., *supra* note 18, at 213 ("discount rates and capitalization rates for investments in small businesses and professional practices are relatively high compared with most other investments").

[85] For example, at a capitalization rate of 15% per annum, the present value of the tenth year income is approximately a quarter of that of the initial year. After seventeen years, the value is less than a tenth. *See* HAMILTON & BOOTH, *supra* note 20, at 24 (table showing present value of future payments).

estimates subject to considerable uncertainty, the discounted cash flow method may give a deceptive impression of precision that the capitalization method does not.[86]

Although there is much more to business valuation than I can summarize here, two other points are relevant to the discussion of the main subject of this article–discounting lost profits. First, the income being valued must be the income attributable to the interest being valued. In other words, if the interests of the equity holders are being valued, then the income available to the equity holders after the debt holders have been paid must be used in the formulas.[87] Second, the discount rate or capitalization rate used must always be adjusted to reflect the risk associated with the income in question.[88]

The relationship between enterprise valuation and lost profits is illustrated when a plaintiff tries to recover for both the profits it lost and the diminished value of its remaining business. Courts generally disallow one of these two claims, pointing out that the plaintiff is trying to recover twice for the same thing because the value of a business in most cases is the present value of the profits the business would earn in the future.[89]

In some cases, however, courts properly award both lost profits and lost business value. This occurs when the court awards the profits lost during the first few years of the loss period and the diminution in enterprise value as of the end of the period.[90] For example, *Matrix Group Limited v. Rawlings Sporting Goods Co.* involved the wrongful termination of a license agreement.[91] The plaintiff's expert calculated the damages by estimating the revenues that the plaintiff would have earned for the ten-year period following the wrongful termination, discounting those revenues to present value

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[86] *See generally* PRATT ET AL., *supra* note 18, at 154 (discussing the importance of an applicable "projection of the economic income that is relevant to the valuation subject").

[87] *See, e.g.*, PRATT ET AL., *supra* note 18, at 213; RISIUS, *supra* note 72, at 66-67.

[88] *See, e.g.*, PRATT ET AL., *supra* note 18, at 160; RISIUS, *supra* note 72, at 87.

[89] *See, e.g.*, Albrecht v. Herald Co., 452 F.2d 124 (8th Cir. 1971) (discussing cases); Forsyth v. Assoc. Grocers of Colo., Inc., 724 P.2d 1360, 1360-64; Knauf Fiber Glass v. Stein, 615 N.E.2d 115 (Ind. Ct. App. 1993), *rev'd on other grounds*, 622 N.E.2d 163 (Ind. 1993); *see also* Kowalski & Kuga, *supra* note 25, at 13-14 (discussing cases). In order to make the discounted present value of lost income precisely equal to the value the business, the lost "income" must include all anticipated future cash flows, including cash flows from such things as sales of non-income producing assets.

[90] *See, e.g.*, Israel Shaked & Allen Michel, *The Mirant Valuation Saga: Epic Battle of Experts*, 24-10 AM. BANKR. INST. J. 40, 42 (2005) (discussing experts' diverging estimates of terminal value in bankruptcy valuation litigation).

[91] 477 F.3d 583 (8th Cir. 2007).

and adding to that amount the "terminal value" of the license agreement.[92] This was the market value that she calculated the licensee would have received if it had sold the license after ten years.[93]

Celebrity Cruises Inc. v. Essef Corp. presented a similar situation.[94] The owners of a cruise line sued the makers of a valve installed in a spa in one of the line's ships.[95] The valve, which was supposed to remove microbes from the water in the spa, failed to do so, causing an outbreak of Legionnaire's Disease among the passengers.[96] The resulting publicity caused a reduction in bookings on the line.[97] Three years after the incident, the cruise line was sold.[98] At issue in the trial were the profits lost from the time of the disease outbreak to the time the line was sold and the reduction in price the seller had to accept because profits would continue to be low after the sale.[99] The jury awarded $48 million dollars for profits lost prior to the sale and $135 million for the lost enterprise value.[100] Although the court later ordered a new trial on the lost profits damages[101] and granted the defendants judgment as a matter of law on the enterprise value claim,[102] these decisions were based on the evidence of the particular losses and there was no question of the propriety of awarding both lost profits and lost enterprise value under these particular circumstances.

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[92] *Id.* at 594 (noting that the expert applied the "constant growth" model).

[93] *Id.*

[94] 478 F. Supp. 2d 440 (S.D.N.Y. 2007).

[95] *Id.* at 442.

[96] *Id.*

[97] *Id.* at 444 (explaining that Plaintiff used broadcast coverage and testimony from cruise line officers and travel agents to substantiate its reduction in bookings claim).

[98] *Id.* The incident occurred in the summer of 1994, and Celebrity sold the cruise line in 1997. *Id.* at 444, 447.

[99] *Id.*

[100] *Id.* at 445.

[101] *Id.* at 452 ("To the extent that [the expert's] yardstick does not accurately predict Celebrity's earnings, it misestimates Celebrity's future cash flows just as it provides an inaccurate figure for Celebrity's lost profits between 1994 and 1997.").

[102] *Id.* at 454.

B. Discounting the Lost Earnings of an Individual

When the case involves personal injury instead of business loss, the analysis is quite different. Courts have developed a special set of rules for discounting future earnings, and, in some cases, future medical expenses of an injured individual. These rules are based on assumptions that are not appropriate in lost profits cases, so the rules are not transferable to lost profits cases.[103] Nevertheless, some courts considering lost profits issues have either analogized to the personal injury rules or unthinkingly imported the rules. It is therefore appropriate to take a moment to review these rules.

The leading case on discounting future earnings of an individual, and the one to which courts constantly refer, is *Jones & Laughlin Steel Corp. v. Pfeifer.*[104] Pfeifer was injured while working on a Jones & Laughlin coal barge and brought an action under the Longshoremen's and Harbor Workers' Compensation Act.[105] The district court, believing it was bound to do so, followed a decision of the Pennsylvania Supreme Court adopting what is known as the "total offset method" of valuing future earnings.[106] A court applying this method simply multiplies the plaintiff's annual earnings at the time of the accident by the number of years he would have been expected to have worked but for the accident, and the product is the award for lost earnings.[107] In the words of one economics professor, "[i]n effect, total offset uses a discount factor of zero."[108] Because the market interest rate and the rate at which an individual's earnings grow over time tend to be equal over the long term, it is a reasonable assumption in most cases that, given the other uncertainties involved in predicting a person's income over their lifetime, the two will simply offset one another.[109] Obviously, the total offset method

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[103] For a detailed explanation of the reasons discount rates are different in the two types of cases, see Leonard J. Sliwoski, *Reconciling Discount Rates: Personal Injury/Wrongful Death Cases, Commercial Damage Cases, Business Appraisal Engagements*, 15 BUS. VALUATION REV. 167 (Dec. 1996). The author notes that the difference in the range of discount rates applied in the two types of cases is very large. *Id.* at 167. His estimate of discount rates in personal injury/wrongful death cases when measured in real dollars is one to three per cent, whereas in commercial cases "[d]iscount rates seem to begin about ten percent to twelve percent, and in many instances they are in the fifteen percent to twenty-five percent or higher range." *Id.*

[104] 462 U.S. 523 (1983).

[105] *Id.* at 525.

[106] *Id.* at 526-27. In its explanation, the *Jones* Court analyzed *Beaulieu v. Elliott*, 434 P.2d 662 (Alaska 1967), which "is regarded as the seminal 'total offset' case." *Jones*, 462 U.S. at 554.

[107] *See id.* at 544-45.

[108] Eli Schwartz, *Settling Claims for Lost Income: The Total Offset Method*, 104 DICK. L. REV. 679, 679 (2000).

[109] *Id.*

will overcompensate some workers and undercompensate others,[110] but against this must be weighed the cost savings because the parties do not have to hire economists to testify as to future inflation and wage growth.

A second basic method is the "net below-market interest rate" method.[111] This method is based on the idea that earnings will grow, but at a rate less than the interest rate used to discount future earnings.[112] By determining a single discount rate that takes into account both the anticipated growth in earnings and the market interest rate, the economist can determine the present value of future earnings without having to further adjust those earnings for inflation. In some versions of this method, future earnings are increased for increased seniority, anticipated promotions, and the like, but increases for anticipated inflation are adjusted for only by using the below-market discount rate.[113] In *Pfeifer*, the Supreme Court said "we do not believe a trial court adopting such an approach in a suit under Section 5(b) [of the Longshoremen's and Harbor Workers' Compensation Act] should be reversed if it adopts a rate between 1 and 3% and explains its choice."[114] The third basic method is simply to allow the litigants to introduce all relevant evidence, to attempt to estimate the plaintiff's earnings in nominal dollars for each year of his anticipated work life, and to discount these earnings using a discount rate appropriate for the period in question.[115] This calculation requires an estimate of the future path of inflation, and, as Justice Stevens put it, risks turning a simple personal injury case "into a graduate seminar on economic forecasting."[116] Nevertheless, it is the method used in many cases involving lost earnings of an individual. It is also the method almost always used to calculate the present value of the lost profits of a business. With these collateral issues as perspectives, we now return to the main theme of this article–the proper discount rate to be applied when lost profits of a business are at issue.

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[110] *See id.* at 680.

[111] *Id.* at 681. This method is also called the "real interest rate" approach and generally "means that the expected rate of inflation is subtracted from the market rate to obtain the real interest rate as the discount rate." *Id.*

[112] *Id.*

[113] *See generally id.* at 683 (showing a table of adjusted incomes based on education and skill levels).

[114] 462 U.S. at 548-49.

[115] *See* Gary A. Anderson & David L. Roberts, *Economic Theory and the Present Value of Future Lost Earnings: An Integration, Unification and Simplification of Court Adopted Methodologies,* 39 U. MIAMI L. REV. 723, 732-34 (1985).

[116] *Pfeifer*, 462 U.S. at 548 (quoting Doca v. Marina Mercante Nicaraguense*, S.A.*, 634 F.2d 30, 39 (2d Cir. 1980).

IV. HOW LOST PROFITS SHOULD BE DISCOUNTED

As detailed in Part V of this article, courts have generally done a poor job of dealing with the discount rate in lost profits litigation. Far too often, courts simply state that the discount rate is a question of fact and allow the trier of fact to believe whichever expert it chooses, regardless of how that expert's testimony deviated from well-accepted principles of accounting and financial economics. This part of the article will attempt to explain these principles of accounting and financial economics in terms that the average lawyer or judge can understand and to provide citations to the relevant academic and professional literature.

A. The Basic Discount Rate–The Cost of Capital

Normally, the proper discount rate to use in calculating the plaintiff's lost profits will be the plaintiff's cost of capital.[117] Although the court decisions are confusing on this point, the academic and professional literature consistently state that this is the proper discount rate.[118] An article co-authored by the emeritus dean of a major business school explains the reason:

> [B]ecause the plaintiff no longer has to bear the investment's risk, the plaintiff is not entitled to be compensated for the risk factors. In short, the plaintiff's damage award should not include the amount of the risk premium (the excess of the present value of the profits discounting at the risk-free rate over discounting at the cost of capital adjusted to the risk of the project). Since damages for future profits should not include the amount of the risk premium, the plaintiff's award should be calculated using the cost of capital adjusted to the risk of the project.[119]

The cost of capital is a metric known and understood by corporate financial managers as the price the firm pays for the money it uses to operate its business.[120] Thus, if the

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[117] *See, e.g.*, RICHARD A. BREALEY & STEWART C. MYERS, PRINCIPLES OF CORPORATE FINANCE 73 (5th ed. 1996) ("Value today always equals future cash flows discounted at the opportunity cost of capital.").

[118] *See, e.g.*, Boudreaux et al., *supra* note 13, at 2-3 ("All estimated cash inflows and outflows must be discounted to present value at an appropriate rate of return which reflects the relative riskiness of the cash flows, as well as the required rate of return to the stakeholders of the business."); Jonathan S. Shefftz, *Taxation Considerations in Economic Damages Calculations,* LITIG. ECON. REV. Summer 2004 at 42, 42 (explaining adjustments to be made to WACC to account for tax effects); Sliwoski, *supra* note 101, at 169 ("The risk associated with the foregone future income stream is effectively measured by suppliers of capital, both debt and equity, to the subject business. Quantifying this risk is in essence the process of estimating the cost of capital.").

[119] Lanzillotti & Esquibel, *supra* note 2, at 130.

[120] *See* BRIGHAM & DAVES, *supra* note 52, at 291-92 (discussing the cost of capital).

plaintiff gets its money ahead of time through a damage award, failure to discount the award at the plaintiff's cost of capital will give the plaintiff a windfall.

To understand this, consider this highly-simplified example. Plaintiff is a heavy equipment dealer carrying several product lines. One of its suppliers breaches its distributorship agreement and, as a result, Plaintiff loses profits of $200,000 per year over the remaining five years of the agreement. At the time of the award, Plaintiff has an outstanding bank loan in excess of $1,000,000 on which it is paying interest at a rate of 10% per annum. The loan matures in five years. If Plaintiff were awarded the full $1,000,000 of lost profits in a lump sum without discounting, it could apply the award to the loan and (assuming no prepayment penalty) gain a windfall in the amount of the interest it saved by applying the profits to the loan balance immediately, rather than over five years, as it would have had to if there had been no breach.[121] This is an admittedly simplistic example and we will explore later in this article a more sophisticated analysis that takes into account the effect of the loan repayment on Plaintiff's other sources of capital.

The reader may ask why we assume that Plaintiff will pay off the loan rather than using the money for some other corporate purpose. The response is that if Plaintiff has a loan on which it is paying interest, there should be no other corporate purpose for which the return on the funds would be less than the cost of that interest.[122] Similarly, if management chooses not to use the damage award in the business but instead to distribute it to the shareholders, it would only be rational to do so if the shareholders can invest the money and obtain a return greater than the 10% that it costs the corporation and, indirectly, its shareholders, to forego paying down the loan.[123]

As noted, this is a highly-simplified example. In the real world, businesses have multiple sources of funds and the effect of receiving funds ahead of time is not so easily calculated. But the calculations can be made, and, in fact, businesses make them constantly. The weighted average cost of capital provides a method of calculation that enjoys near-universal acceptance in the business community.[124] Business strategists routinely use it to determine whether a business should make an investment in building

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[121] This amount would have to be adjusted to take into account any taxes the plaintiff saves on account of its interest expense. *See infra* text accompanying note 136.

[122] This would not be the case, of course, if the loan carried a substantial prepayment penalty. But such penalties are unusual in working capital loans.

[123] *See* BRIGHAM & DAVES, *supra* note 52, at 296 (discussing opportunity cost).

[124] *Id.* ("*Thus, the firm should earn on its reinvested earnings at least as much as its stockholders themselves could earn on alternative investments of equivalent risk.*") (emphasis in original).

a new plant, developing a new product line, acquiring another firm, and the like.[125] It has become such an important part of business planning that many large companies now use it as a factor in their executive compensation plans.[126] The United States Environmental Protection Agency even advocates the use of the cost of capital in calculating civil penalties for noncompliance or delayed compliance with EPA regulations.[127]

Before explaining how the cost of capital is calculated, it may be helpful to discuss another reason the cost of capital should be used as the rate at which to discount lost profits: the cost of capital is the rate used to discount future cash flows when the value of the business as a whole is being determined.[128] Both the theoretical literature and the judicial decisions are consistent in stating that the value of a business is the present value of future cash flows that the business will produce.[129] To discount the future cash flows to present value in valuation cases, courts use the cost of capital,[130]

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[125] *See* BREALEY ET AL., *supra* note 54, at 215 ("Today most companies start with the *company cost of capital* as a benchmark risk-adjusted discount rate for new investments.") (emphasis in original); Patrick Halligan, *Cramdown Interest, Contract Damages, and Classical Economic Theory*, 11 AM. BANKR. INST. L. REV. 131, 154 (2003) ("cost of capital often is used as a discount rate for evaluating possible investments").

[126] *See* BRIGHAM & DAVES, *supra* note 52, at 291 (surveys indicate almost half of large companies use compensation plans based on metric which relies on cost of capital).

[127] *See* Michael J. Podolsky, Note, *The Use of the Discount Rate in EPA Enforcement Actions*, 52 CASE W. RES. L. REV. 1009, 1010 (2002) (explaining that discounting is necessary because of the significant time lag between EPA violations and the assessment of civil penalties).

[128] *See, e.g.*, PRATT ET AL., *supra* note 18, at 159; *see also Celebrity Cruises Inc. v. Essef Corp.*, 478 F. Supp. 2d 440, 452-54 (S.D.N.Y. 2007); Yozzo & Eisenberg, *supra* note 3, at 38 (WACC used to discount cash flows for enterprise valuation); Estate of Deputy, T.C. Memo 2003-176 (2003) (both parties' experts used cost of capital to determine capitalization rate in business valuation dispute); Estate of Dunn v. Comm'r, T.C. Memo 2000-12 (2000) (parties agreed to capitalization rate of 21.67%); Estate of Hendrickson v. Comm'r, T.C. Memo 1999-278 (1999) (discounted cash flow method of calculation discounts projected cash flows at rate equal to cost of capital).

[129] *See, e.g.*, KENNETH R. FERRIS & BARBARA S. PECHEROT, VALUATION: AVOIDING THE WINNER'S CURSE 74 (2002) ("Discounted cash flow analysis is premised on one of corporate finance's most fundamental notions: *The value of an asset (or bundle of assets) today is equal to the present value of the future cash flows expected to be provided by the asset over its economic life.*") (emphasis in original); Kolaski & Kuga, *supra* note 25, at 21 ("Most of the confusion . . . between lost profits and loss of business value damages could be resolved if the courts and the attorneys recognized that both of these calculations are measuring the same thing–the profits of the plaintiffs' business following the defendants' allegedly harmful behavior."); Lanzillotti & Esquibel, *supra* note 2, at 125 (measurement of lost profits and lost going concern value are conceptually synonymous when the concepts will yield the same result when properly applied); *see also supra* text accompanying note 76.

[130] *See, e.g.*, *Celebrity Cruises Inc.*, 478 F. Supp. 2d at 452-43; Estate of Deputy, T.C.M. (CCH) 1497 (2003) (both parties' experts used cost of capital to determine capitalization rate in business valuation dispute);

and the academic and professional literature agrees that this is the proper discount rate to use.[131]

It would be wrong to use one discount rate to value the business and another to value future profits because, as both courts and economic theorists frequently state, the value of the business is the discounted present value of its future profits.[132] For example, when the defendant's action has caused the destruction of the business (rather than merely the loss of a portion of the profits), the damages may be measured by either (1) the value the business would have had but for the acts of the defendant or (2) the profits lost because of the acts of the defendant.[133] These are considered alternative measures because both give the same result. In fact, the two measures are often used together. It is common to estimate the profits lost for the first few years following the wrongful act and then to estimate a "terminal value," i.e., a value the business would have had at the end of the period for which profits were estimated.[134] The sum of these two numbers is the value of the business.[135] It would make no sense to use a risk-free

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Estate of Hendrickson v. Comm'r, 78 T.C.M. (CCH) 322 (1999) (discounted cash flow method of calculation discounts projected cash flows at rate equal to cost of capital); *cf.* E. Minerals Int'l, Inc. v. United States, 39 Fed. Cl. 621, 626-27 (1997), *rev'd on other grounds sub nom.* Wyatt v. United States, 271 F.3d 1090 (Fed. Cir. 2001) ("The discount rate represents the rate of return an investor would require in order to risk capital on the project. The rate is a combination of the time value of money and the risk involved in the transaction.").

[131] *See* Israel Shaked & Allen Michel, *The Mirant Valuation Saga: Epic Battle of Experts*, 24-13 AM. BANKR. INST. J. 40, 41 (2005-06) ("Cash flows in a DCF model are usually discounted at the company's weighted average cost of capital (WACC)."); Yozzo & Eisenberg, *supra* note 3, at 38 (WACC a critical determinant of value of firm).

[132] *See supra* note 123; *see also* Lehrman v. Gulf Oil Corp., 500 F.2d 659, 663-64 (5th Cir. 1974) (noting that going concern value and future lost profits are alternative measures of damages; future lost profits is a crucial component of going concern value); Albrecht v. Times Herald, 452 F.2d 124, 129 (8th Cir. 1971) (same); *In re* Med Diversified, Inc., 334 B.R. 89, 98-99 (Bankr. E.D.N.Y. 2005) (excluding testimony of valuation expert who failed to use DCF method).

[133] *See, e.g.*, Fishman v. Estate of Writz, 807 F.2d 520, 578 (7th Cir. 1986) (Easterbrook, J., dissenting) ("[C]apital loss and lost profits are usually the same. The capital value is the value of the profit stream."); Franklin M. Fisher & R. Craig Romaine, *Janis Joplin's Yearbook and the Theory of Damages*, 4 J. ACCT, AUDITING & FIN. 145, 150 (1990) ("[T]here is no difference in principle between a claim for a stream of lost profits and a claim for the destruction of an asset.").

[134] *See supra* text accompanying notes 94-102.

[135] *See, e.g.*, PRATT ET AL., *supra* note 18, at 154 (analysis should include discounted income for discrete period and projected proceeds from sale at terminal period); Stuart C. Gilson, Edith S. Hotchkiss & Richard Ruback, *Valuation of Bankrupt Firms*, 13 REV. FIN. STUDIES 43, 50 (2000) (employing DCF analysis with terminal value to value firms in bankruptcy reorganization); Steven N. Kaplan & Richard S. Ruback, *The Valuation of Cash Flow Forecasts: An Empirical Analysis,* 50 J. FIN. 1059, 1059-60 (1995) (noting their analysis employs this methodology); Timothy J. Meinhart, *Estimating Discount Rates and Capitalization Rates*,

rate for one part of the calculation and then switch to a risk-adjusted rate for the second. This would make the value of the business dependent upon the point at which the analyst chose to change from one method to the other. Moreover, as another commentator has noted, use of anything other than the cost of capital in a case in which an entire business or line of business was destroyed would allow the analyst to choose different damage amounts simply by choosing between the lost profits and enterprise valuation modes of analysis.[136]

It should also be noted that lost profits cases sometimes rely on valuation cases for the proposition that the cost of capital should be used.[137] While this is not done as commonly as it might be, I have found no authority even suggesting that it is not entirely appropriate to do so.

B. Determining the Cost of Capital–Weighted Average Cost of Capital

Because firms have a variety of sources of capital, each with different costs, analysts make most decisions on the basis of the firm's weighted average cost of capital or "WACC."[138] WACC is calculated by determining the cost of each of the firm's sources of capital, multiplying the cost of that component by the percentage of the firm's total capital attributable to that component, and summing the results.[139] For instance, suppose a firm has only two sources of capital–bank loans and common stock. The bank loans cost the firm 6% and comprise 40% of the total. The common stock cost 12% and comprise 60% of the total. The WACC would be:

.06 the cost of the bank loans

x.40 the percentage of the capital attributable to the bank loans

=.024

plus

INSIGHTS (SPECIAL ISSUE) 27, 27 (2004) (discussing use of terminal value in analysis of enterprise value).

[136] Richard G. Schneider, *Damages for the Termination of a Business Interest*, 49 ANTITRUST L. J. 1295, 1301 (1980).

[137] *See*, *e.g.*, Franconia Assoc. v. United States, 61 Fed. Cl. 718, 764 (2004) (relying on E. Minerals Int'l, Inc. v. United States, 39 Fed. Cl. 621, 629 (1997)).

[138] *See, e.g.*, BANKS, *supra* note 14, at 64; BRIGHAM & DAVES, *supra* note 52, at 292-93; Boudreaux et al., *supra* note 13, at 4.

[139] *See* Celebrity Cruises Inc. v. Essef Corp., 478 F. Supp. 2d 440, 452 (S.D.N.Y. 2007) ("analysis is dependent upon … selecting an appropriate figure for the WACC, which [the analyst] uses to discount future cash flows."); BANKS, *supra* note 14, at 64 (providing a formula for WACC).

.12 the cost of the common stock

x.60 the percentage of the capital attributable to the common stock

=.072

This gives a total cost of capital of .096 or 9.6% per annum. Thus, the first step in determining the WACC is to determine the percentage of the firm's capital that is attributable to each of the individual sources of capital. These could include common stock, preferred stock, bonds, bank loans, and loans from the firm's owners.

Determining the cost of the firm's debt is relatively easy.[140] There are only a couple of relatively minor complications. The first is that the analyst must use the marginal cost of the debt rather than the average cost because it is at the margin that the lost profits recovery will have its effect, allowing the firm to pay off its most expensive debt or to avoid taking on new, more expensive debt.[141] Obviously, there will be exceptions. For instance, where the lost profits recovery is so large that it allows the firm to retire not only its most expensive debt, but also a significant amount of less expensive debt. In such a situation, an expert deviating from the norm in his calculation of WACC should be required to present a good reason for soothe deviation.

Also, because interest paid on a debt is deductible in calculating the firm's income tax, the component cost of the debt must be reduced by the plaintiff's marginal tax rate.[142] For example, when a firm pays 8% per annum for a bank loan and pays taxes on its income at a 25% marginal rate, the effective (after tax) cost of the loan is only 6%, and 6% rather than the 8% nominal cost should be used in calculating that loan's contribution to the WACC.

Determining the cost of equity capital is much more complex. For large companies, financial professionals most often use the capital asset pricing model, usually referred to as "CAPM."[143] CAPM was developed by William Sharpe, building on the

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[140] *See* Jacobson, *supra* note 3, at 6 ("Estimating the cost of debt is conceptually simpler than estimating the cost of equity.").

[141] *Cf.* BRIGHAM & DAVES, *supra* note 52, at 294 (marginal cost of debt used where WACC is used to evaluate potential investments); Jacobson, *supra* note 3, at 6 (suggesting use of company's most recent borrowings as basis for cost of debt).

[142] *See* BANKS, *supra* note 14, at 104-05 (discussing the deductibility of interest expenses); BRIGHAM & DAVES, *supra* note 52, at 294-95 (providing a formula for the "after-tax cost of debt").

[143] *See, e.g.*, BERNSTEIN, *supra* note 52, at 201 ("CAPM . . . remains the keystone in investment theory, theories of market behavior, and the allocation of capital in both public and private enterprises."); BRIGHAM & DAVES, *supra* note 52, at 306 ("the CAPM approach is by far the most widely used method"); Timothy J. Meinhart, *supra* note 135, at 28 (CAPM probably best known method for estimating cost of

work of Harry Markowitz.[144] For their work, Sharpe and Markowitz shared the 1990 Nobel Prize in Economics.[145]

While the work of Markowitz and Sharpe involves some mathematics that are beyond the scope of this article, we can explain fairly simply those basics of CAPM we need to know to calculate the risk premium for lost profits. CAPM divides the risks to which any investment is subject into two types. "Systematic risk" is the risk that the value of the investment will go up or down as "the market" goes up or down.[146] These up or down movements would be caused by factors that affect firms generally, such as boom, recession, inflation, war, or changes in investor psychology.[147]

The other type of risk, "unsystematic risk," is the risk that is peculiar to this individual investment or to a limited group of similar investments.[148] For example, unsystematic risks in an oil company stock would include the success or failure of the company's exploration program, expropriation of foreign holdings, and changes in patterns of energy consumption.

One of Markowitz's great insights, now part of mainstream finance doctrine, is that when investors in a particular asset have the ability to diversify, they do not need to be compensated for systematic risk.[149] For this reason, systematic risk is often called "diversifiable risk."[150] When investments are held in a well-diversified portfolio, the unsystematic risk is reduced to an insignificant amount because the amounts by which some investments' returns are below their expected value will be offset by the amounts that other investments' returns are above their expected value.[151] Economists

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equity capital); *see also* PRATT ET AL., *supra* note 18, at 164 ("CAPM is a conceptual cornerstone of modern capital market theory.").

[144] *See* BERNSTEIN, *supra* note 52, at 41.

[145] *Id.*

[146] PRATT ET AL., *supra* note 18, at 164.

[147] *Id.*

[148] *Id.*

[149] *See* BERNSTEIN, *supra* note 52, at 47 (discussing the reasons for diversification); BREALEY ET AL., *supra* note 54, at 181 (discussing the "common practice" of diversification).

[150] BREALEY ET AL., *supra* note 54, 162. It is also called "market risk." *See id.*

[151] *See* BANKS, *supra* note 14, at 54 ("by creating the right mix of projects/investments, the overall risk of the firm's portfolio can be reduced"); BREALEY ET AL. *supra* note 54, at 161 ("[e]ven a little diversification can provide a substantial reduction in variability"; BRIGHAM & DAVES, *supra* note 52, at 32 (noting that it is "theoretically possible" to create a risk-free portfolio).

commonly illustrate this with a hypothetical about coin flips. Suppose you pay $100,000 for a coin flip. If the coin comes up heads, you win $200,000. If the coin comes up tails, you get nothing and, of course, go away without your hundred grand. This is a very risky proposition. To put it in mathematical terms, the standard deviation is $100,000.[152] In contrast, suppose that instead of a single coin flip, you were offered 10,000 coin flips. Each flip costs $10 and in each case you receive $20 if the coin lands heads and nothing if it lands tails. You are still making a total of $100,000 in bets, but you have a much less risky proposition. The standard deviation for the entire sequence of bets is now only $1,000.[153] This means there is approximately a two-thirds chance that your gain or loss will not exceed $1,000 and approximately a 95% chance your gain or loss will not exceed $2,000.

The stock market, or any other group of investments, works the same way. By spreading out your investments, you can reduce the risk. But there is an important difference between coin flips and financial investments. With financial investments, you are subject to systematic risk. Although you can reduce the unsystematic risk to an insignificant amount by diversifying, you cannot eliminate systematic risk. Data shows that the standard deviation for a portfolio consisting of only two publicly-traded stocks (randomly selected) is approximately 35%, whereas the standard deviation of a well diversified portfolio of such stocks is approximately 20%.[154] This means that much of the risk of investing in stocks may be eliminated through diversification, and a well diversified stock portfolio is generally considered to include 40 or more stocks in different industries.[155]

Because some risks cannot be eliminated by diversification, investors demand compensation for those risks in the form of higher returns.[156] In other words, if stocks did not offer expected returns greater than those of United States Treasury securities, rational investors would purchase treasuries to the exclusion of stocks. Historically, the

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[152] The calculation in this case is SD = $\sqrt{[0.5(\$200{,}000 - \$100{,}000)^2 + 0.5(0 - \$100{,}000)^2)}$. *See supra* note 53.

[153] The calculation is SD = $\sqrt{[0.5\ (\$20 - \$10)^2 + 0.5\ (\$0 - \$10)^2]} \times \sqrt{[10{,}000]}$. *See supra* note 53.

[154] *See* Meir Statman, *How Many Stocks Make a Diversified Portfolio?*, 22 J. FIN. & QUANT. ANAL. 353, 335 (1987) (illustrating the expected returns on investment based on the number of stocks in a portfolio); BREALEY ET AL., *supra* note 54, § 7.2 (discussing the measurement of portfolio risk); BRIGHAM & DAVES, *supra* note 52, at 36 (discussing standard deviations in a market portfolio).

[155] BRIGHAM & DAVES, *supra* note 52, at 37; *see also* Statman, *supra* note 152 (30 randomly chosen stocks are required for a borrowing investor and 40 for a lending investor). *But cf.* BREALEY ET AL., *supra* note 54, § 7.2 (most benefits of diversification can be obtained with a portfolio of 20 stocks).

[156] By "risky investments" I mean investments other than United States Treasury securities. Some of these investments have relatively little risk (e.g., AAA-rated corporate bonds), while others have a great amount of risk (e.g., stocks in bio-tech start-ups).

returns on publicly-traded stocks have exceeded those on United States Treasury securities by a substantial amount. Estimates vary from less than 6% to more than 16%, depending on the time period used and other factors.[157] Conventional economic theory holds that these increased returns occur only because investors will not buy investments with systematic risk unless they get higher returns to compensate them for that risk.[158]

Because systematic risk cannot be eliminated by diversification, systematic risk is an important determinant of the return that investors will demand as compensation for purchasing a particular investment. Individual investments differ as to the amount of systematic risk they contribute to a portfolio. Systematic risk is generally measured by comparing the fluctuations of the individual investment to the fluctuations of the market indices. The fluctuations of these indices are, of course, the averages of the fluctuations of individual investments. In the stock market, for example, some stocks fluctuate more than the market as a whole; some fluctuate less. Financial professionals use the beta coefficient as a measure of systematic risk.[159] A stock's beta coefficient, usually just referred to as its "beta," is a measure of the stock's tendency to move with the general market.[160] A stock with a beta of 1.0 will fluctuate as much as the market as a whole. A stock with a beta of 2.0 will fluctuate twice as much as the market as a whole, and a stock with a beta of 0.5 will fluctuate half as much as the market as a whole.

CAPM holds that a stock's beta determines its "risk premium," which, in this context, means the difference between the expected return of the stock and the risk-free

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[157] *See, e.g.*, ASWATH DAMODARAN, THE DARK SIDE OF VALUATION: VALUING OLD TECH, NEW TECH, AND NEW ECONOMY COMPANIES 4 (2001) (table showing premiums ranging from 5.36% to 16.12% per annum, depending primarily on the time period from which data is taken); *see also* Shaked & Michel, *supra* note 131, at 41 (in multi-billion dollar valuation litigation, some experts used 7.2% based on data from 1926 to 2004; others used risk premiums of 2.55 to 4.32 percent based on much more recent data).

[158] BREALEY ET AL., *supra* note 54, § 8.2.

[159] The term "systematic risk" was first used in 1961 by William Sharpe, who used the letter "b" to represent systematic risk in his equations. BERNSTEIN, *supra* note 52, at 188-89. For the next ten year "b" continued to be used in equations as the symbol for systematic risk, but it has since been supplanted by beta (β). *Id.*

[160] Mathematically, the beta is defined as $\beta_i = (\delta_i/\delta_m)r_{im}$, where β_i is the beta of the individual stock in question, δ_i is the standard deviation of the stock in question, δ_m is the standard deviation of the market as a whole, and r_{im} is the correlation coefficient of the individual stock with the market as a whole. BRIGHAM & DAVES, *supra* note 52, at 40. Alternatively, the beta can be defined as the slope of the regression line of the stock's returns when plotted against the returns of the market as a whole, where the returns on the stock in question are the vertical axis and the returns on the market as a whole are the horizontal. *Id.* at 40. In any case, both formulations yield the same number for the beta.

rate of return.[161] In other words, the risk premium is the reward the investor expects to get for owning the stock instead of a risk-free investment.[162] Because a stock with a beta of 1.0 has, by definition, the same amount of systematic risk as the market as a whole, it will command a risk premium exactly equal to that of the market as a whole. Similarly, a stock with a beta of 0.5 will command only half that risk premium, and a stock with a beta of 2.0 will command twice the risk premium of the market as a whole. Thus, if the expected return on United States Treasury securities is 6% and the risk premium of the market as a whole is 5%,[163] a stock with a beta of 2.0 should command a risk premium of 10% per annum and give a total return of 16% per annum, while a stock with a beta of 0.5 should command a risk premium of 2.5% per annum and yield a total return of 8.5% per annum.

While the theory is well accepted,[164] choosing the correct beta in an individual case involves a number of subjective determinations.[165] When the company in question is not a publicly-traded company with a long history of stock prices to use as a basis for the calculation, the analyst may look at betas for the industry in which the plaintiff is involved or betas for particular firms that are similar to the plaintiff.[166] The analyst typically adjusts these for company-specific factors.[167] Even when stock price data for the subject company is available, there is the question of the measurement period. Betas change over time, so if too long a measurement period is used, a risk of using outdated data arises. On the other hand, using too short a period risks having too small a sample.

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[161] BRIGHAM & DAVES, *supra* note 52, at 48-49. It is important to note that "expected return" means the mathematical expected value as developed in Part II.B., not the best case or "hoped-for" return.

[162] "Expects" is used here in the technical sense of expected value. *See supra* Part II.B.

[163] As noted above, (see *supra* text accompanying note 145) estimates of the risk premium of the market as a whole range from less than 6% to more than 16%.

[164] There have been a number of theoretical attacks on CAPM. *See* BREALEY ET AL., *supra* note 54, § 8.3 (describing tests of CAPM and alternative theories); BRIGHAM & DAVES, *supra* note 52, at 86-99 (same). Nevertheless, it remains the most often employed methodology among analysts who are putting their money (or that of their employers or clients) at risk. *See* BRIGHAM & DAVES, *supra* note 52, at 306 ("the CAPM approach is by far the most widely used method"). For a study finding CAPM superior to the competing Fama-French three factor model, see Steven N. Kaplan & Richard S. Ruback, *The Valuation of Cash Flow Forecasts: An Empirical Analysis,* 50 J. FIN. 1059, 1059 (1995).

[165] *See* Jacobson, *supra* note 3, at 4 ("There may be more controversy associated with the selection of the appropriate beta than with the selection of other discount rate components.").

[166] *See id.* at 5.

[167] *See id.* ("[T]he analyst should adjust for any differences through the application of an unsystematic risk premium.").

The most commonly used method samples betas monthly over a period of five years.[168] There have been claims, however, that this is due more to custom than to any practical or theoretical justification.[169]

There are alternative methods of calculating the cost of equity capital that have come into sufficiently widespread use that an expert should be allowed to use as an alternative to CAPM. For instance, the Arbitrage Pricing Theory (APT) is similar to CAPM, but for each firm, it employs a number of different betas.[170] Each of these betas measures the sensitivity of that firm's returns to a particular economic factor.[171] These factors might include things such as the national level of industrial production, the level of inflation, and the degree of risk aversion among investors generally.[172] Analysts employing APT use a complex statistical procedure called "factor analysis" to determine which factors most influence a particular firm's returns and affect its cost of capital.[173]

Using one or more of the accepted methods, the analyst can determine the component cost of the common stock in the plaintiff's capital mix. There will, of course, be differences and disagreements concerning the data to be used and the details of the calculations.[174] However, absent good reason, the expert's model should follow the basic outlines described above. Larger firms will normally have calculated their cost of capital as part of their internal financial planning processes. These calculations, particularly when made before litigation was contemplated, should be given considerable weight, regardless of whether it is the plaintiff or the defendant who is relying on them. Any expert who deviates significantly from the numbers the plaintiff

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[168] *See, e.g.*, BRIGHAM & DAVES, *supra* note 52, at 85; Jacobson, *supra* note 3, at 5.

[169] *See* BRIGHAM & DAVES, *supra* note 52, at 85 n.14.

[170] *See generally id.* at 89-92 (discussing the Arbitrage Pricing Theory).

[171] *See id.* at 87 (discussing the "Tests of the Stability of Beta Coefficients").

[172] *Id.* at 91.

[173] *Id.* at 91-92.

[174] *See* Celebrity Cruises Inc. v. Essef Corp., 478 F. Supp. 2d 440, 452-55 (S.D.N.Y. 2007) (plaintiff's and defendant's experts used different betas, resulting in $140 million difference in damage estimates); Christopher P. Bowers, *Comment, Courts, Contracts, and the Appropriate Discount Rate: A Quick Fix for the Legal Lottery*, 63 U. CHI. L. REV. 1099, 1125 (1996) (arguing that calculation of cost of equity capital using CAPM is too complicated and expensive); Jacobson, *supra* note 3, at 159-60 (listing reasons subjective judgment is involved in calculating cost of equity capital); Yozzo & Eisenberg, *supra* note 3, at 38 ("The determination of a debtor's weighted average cost of capital . . . is a highly subjective exercise . . . .").

used in its financial planning should have to make a convincing argument why their calculations are correct and those of the plaintiff's financial analysts are wrong.[175]

C. Additional Factors in Determining the Discount Rate

In addition to the basic factors discussed above, the analyst may or may not take numerous other factors into account in determining the proper discount rate to apply in a particular lost profits case. Such considerations include: (1) the size premium, (2) the premium for non-diversifiable risk, (3) factors applicable in small company cases, (4) the projected risk, and (5) the premium for non-occurrence. Each of these are discussed below.

1. Size Premium

If the firm is not among the few hundred largest companies in the world, then the analyst should consider increasing the risk premium for equity capital to reflect the fact that risk increases as size diminishes.[176] As a leading treatise notes, "a substantial body of published research indicates that . . . stocks of smaller companies are riskier than larger ones and that small-company stocks command a higher expected rate of return in the market."[177] Ibbotson Associates annually publishes a compilation of financial data that is widely relied upon by academics and practitioners as an authoritative source of data concerning the cost of capital.[178] Based on data compiled by the University of Chicago Center for Research on Security Prices (CRSP), Ibbotson Associates has developed suggested "size premia."[179] These amounts should be added to the equity risk premium to reflect additional risk that is inherent in a company solely because of its size. These premia are *in addition to* the equity risk premium already calculated using CAPM or one of its alternatives.[180]

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[175] *Cf. Celebrity Cruises Inc.*, 478 F. Supp. 2d at 454 (court influenced by fact that cost of capital calculated by investment bankers involved in sale of business was consistent with defendants' expert's estimate and not with plaintiffs' expert's).

[176] *See* ROGER G. IBBOTSON & REX A. SINGUEFIELD, STOCKS, BONDS, BILLS AND INFLATION: HISTORICAL RETURNS (1926–1987), 105-118 (Dow Jones & Co. 1989).

[177] PRATT ET AL., *supra* note 18, at 181; *see also* Michael Annin & Dominic Falashetti, Is There Still A Size Premium? *available at* http: corporate.morningstar.com/ib/documents/MethodologyDocuments/IBBAssociates/SizePremium.pdf (last visited Sep. 1, 2007).

[178] PRATT ET AL., *supra* note 18, at 181 (discussing the *SBBI Yearbook* published by Ibbotson Associates).

[179] *Id.*

[180] *Id.*

2. Premium for Non-Diversifiable Risk

CAPM and its alternatives are based on the assumption that investors do not need to be compensated for non-systematic risk because they can diversify it away.[181] This assumption is valid for large, publicly-traded companies. However, when circumstances are such that the equity holders must have a significant portion of their personal or corporate wealth invested in the firm, this assumption is no longer valid. The equity holders will incur non-systematic risk and the cost of equity capital may be adjusted upward to compensate them for it.[182]

Consider a small, family-owned construction company. The company is not large enough to attract public investors or to incur the costs of raising public capital. As a result, family members must provide the equity capital. Because each family member has a significant portion of his personal wealth tied to the welfare of the company, each family member takes the chance that adverse events in the company or a general downturn in the construction business will substantially reduce his wealth. Why does the family not liquidate the company and invest in a well-diversified portfolio of publicly-traded stocks that would present much less risk? The answer is that they expect their return on investment in the family company to be significantly greater than the expected return on a portfolio of publicly-traded stocks. This increased return is a cost that should be included in the cost of equity capital.

3. Additional Factors in Cases Involving Very Small Companies

Very small companies, those with only a few owners and a few million dollars or less in capitalization, present additional complications. In an article in the *Journal of Legal Economics*, Gene Trevino explained in detail how to formulate an appropriate discount rate for the lost earnings of a small business.[183] While I will not repeat his discussion here, he raises two particularly noteworthy points that must be considered in determining the appropriate discount rate for a small business.

First, it is often appropriate to disregard the cost of debt capital and treat the business as being financed entirely by equity. Banks typically require that loans to small

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[181] *See supra* text accompanying notes 143-55.

[182] *See* PRATT ET AL., *supra* note 18, at 170 (where unsystematic risk is not diversified away, "it is worth considering" including a part of unsystematic risk in cost of capital); *see also* Boudreaux et al., *supra* note 13, at 5-6 (noting that owners of closely-held firms may expect higher returns because of non-diversifiable risk and may obtain some of those returns in the form on non-economic benefits such as prestige).

[183] Gene A. Trevino, *A Note on Formulating and Corroborating Discount Rates for Small Firms*, J. LEG. ECON. Winter 1997/1998 at 45, 45.

businesses be guaranteed by the owners of the business.[184] As Judge Easterbrook explained in *Fishman v. Estate of Wirtz*, the interest rate charged on these loans does not represent the real cost of capital.[185] The guaranties shift most of the loan's risk to the business's owners. The shift makes loans similar to equity. Thus, in many cases, the most appropriate procedure is to treat the firm as being financed entirely by equity.[186]

Second, even though the data necessary to make precise calculations of the small firm's cost of capital is hard to come by, such data is available and methods of estimation based on this data do exist.[187] Expert testimony that fails to consider all of the available data or fails to use the available methods of corroboration should be excluded under *Daubert*.

4. Project Risk

Sometimes it will be appropriate to use a discount rate higher or lower than the firm's cost of capital to adjust for the fact that the source of the lost profits claim was a project with risk characteristics different from the risk characteristics of the firm as a whole.[188] Intuitively, a high-risk project should carry a higher discount rate and a low-risk project should carry a lower one. However, calculating the project risk is difficult, and it often requires subjective judgments.[189] Consider, for example, Burger Duke, a chain of fast-food restaurants specializing in hamburgers. Burger Duke had planned to expand into Mexico to take advantage of the nation's growing market for American

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[184] *See id.* at 48. Alternatively, the lender may require that the loan be collateralized with other assets of the owner, which in the case of very small businesses may include a mortgage on the owner's personal residence. ROBERT M. LLOYD, SECURED TRANSACTIONS 538-40 (Bender 1988). This collateralization has much the same effect on the owner's risk as a guaranty.

[185] 807 F.2d 520, 581 (7th Cir. 1986) (Easterbrook, J., dissenting).

[186] There may be other situations in which it is appropriate to treat the firm as being financed entirely by equity. For instance, in a leasing company, the vast majority company's debt is being used to finance the leases, rather than for capital expenditures. Therefore may be appropriate to treat the interest cost as an operating expense, rather than a cost of capital. *See* Jacobson, *supra* note 3, at 3.

[187] *See* Trevino, *supra* note 169, at 50; *see also* ALBERT N. LINK & MICHAEL H. BOGER, THE ART AND SCIENCE OF BUSINESS VALUATION 63-66 (Quorum Books 1999) (describing the build-up method for determining discount rates).

[188] *See* BREALEY ET AL., *supra* note 54, at 215-16 (noting that "[e]ach project should in principle be evaluated at its *own* opportunity cost of capital"). For an extensive discussion of this issue by three professors of finance and economics, see James J. Meyer, Patrick Fitzgerald & Mostafa Moini, *Loss of Business Profits, Risk and the Appropriate Discount Rate,* J. LEG. ECON. Winter 1994 27, 27.

[189] *See* BREALEY ET AL., *supra* note 54, at 217 ("[M]easuring differences in risk is difficult to do objectively….").

food. These plans, however, were thwarted by the wrongful acts of the defendant. In theory, Burger Duke will be compensated properly for its loss if the court discounts the lost profits in a way that takes into account the risk of this project, rather than the risk of the firm as a whole.[190]

Unfortunately, the methods for determining project risk are subjective and imprecise.[191] For this reason, a court should not look askance at an expert who uses Burger Duke's corporate cost of capital as a discount rate for the profits of the project. On the other hand, if an expert witness attempts to show that the project would have increased or decreased Burger Duke's overall corporate risk,[192] then a court should be allowed to take this effect into account, so long as the expert's analysis is based on sound economic principles and not simply on unsupported assumptions.[193]

5. Premium for Non-Occurrence

In the previous discussion, we have assumed that the amount of lost profits being discounted was the *expected value* of the lost profits, that is, the average values of the outcomes weighted by the probability of the occurrence of each of the potential outcomes.[194] As Robert Dunn and Everett Harry noted in an article in the *Journal of Accountancy*, many experts do not base their lost profits projections on an expected value of profits, but on what Dunn and Harry refer to as a "hoped-for" amount.[195] These experts add an additional amount to the base discount rate to account for the fact that the profits they project may never be realized.[196]

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[190] *See* Jacobson, *supra* note 3, at 7 ("[I]f the lost profits relate to a new line of business that the subject company has proposed to enter, it may be appropriate to use a discount rate that reflects the higher level of risk inherent in such an income stream.").

[191] *See* BRIGHAM & DAVES, *supra* note 52, at 315 ("The estimation of project betas is much more difficult [than estimation of firm betas], and more fraught with uncertainty.").

[192] Even a project risky in itself might reduce the firm's overall market risk by increasing the firm's diversification. For example, entry into foreign markets could reduce the firm's dependence on the United States economy.

[193] *See* Robert M. Lloyd, *Proving Lost Profits After* Daubert*: Five Questions Every Court Should Ask Before Admitting Expert Testimony,* 41 U. RICH. L. REV. 379, 399-400 (2007) (expert testimony based on unsupported assumptions should be excluded).

[194] *See supra* Part II.B.

[195] Robert L. Dunn & Everett P. Harry, *Modeling and Discounting Future Damages*, J. ACCT Jan. 2002 at 49, 49.

[196] *See id.* It would be more appropriate, of course, to say that the increase is to compensate for the fact that the profit projection the experts are using exceeds the expected value of the profits, but when using this method, they are seldom so precise.

For example, suppose that a fast-food franchisee breached her franchise agreement, resulting in a termination of the franchise. Prior to termination, the franchisor earned steady and predictable earnings of $100,000 per year from the franchise. These earnings were increasing at a rate of 3% per year. The franchisor might calculate its damages by projecting profits of $100,000 per year, increasing at 3% per year over the remaining life of the franchise agreement and adjusting for the fact that the franchise might terminate for reasons other than the franchisee's breach[197] by adding to the discount rate that would normally be applied (e.g., the plaintiff's cost of capital) and an additional amount to compensate for the revenues that might be lost because of premature termination.[198] We might call this addition to the discount rate a "premium for non-occurrence." Dunn and Harry caution against this approach.[199] They note that the premium necessary to compensate for the possibility of non-realization is very difficult for non-experts to understand.[200] As the time period in question increases, the necessary premium changes drastically. If the period over which the damages will be discounted is very short, the required addition to the base discount rate is huge, but it declines exponentially as the time period increases.[201]

While this use of a projection greater than the mathematical expected value coupled with a compensating higher discount rate is less than ideal,[202] it is clearly not

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[197] These might include changes in tastes or traffic patterns or contingencies specified in the contract.

[198] This example is based on *Dunkin' Donuts, Inc. v. Arkay Donuts, LLC*, No. 05-387 (JWB), 2005 U.S. Dist. LEXIS 43540 (D.N.J. Aug. 24, 2005).

[199] *See generally* Dunn & Harry, *supra* note 195, at 51 (demonstrating various risks involved in discounting future income).

[200] *Id.* at 54-55; *see also* David A. MacPherson & Stanley P. Stephenson, *Lost Profits Damages to New Businesses: Adjusting for Survival*, 1 J. BUS. VALUATION & ECON. LOSS ANALYSIS, 1, 9-11 (2006) (noting that although expert witnesses often adjust discount rates to compensate for potential business failure, adjusting expected values is more precise and transparent).

[201] As an example, consider a variation on our example of a fast-food franchise. Assume the franchisee breached before the restaurant was to go into operation. Assume further that there was a 25% chance the restaurant would fail to open for causes that were the fault of neither the franchisor nor the franchisee and that if the restaurant went into operation, the franchisor would be assured of earnings of $50,000 per year. If the discount rate before considering a 25% chance the restaurant would fail to open was 5%, the additional premium necessary to account for the reduced expected value would be 17.0% percent if the term of the franchise agreement were three years, but it would drop rapidly if the term were increased. For a four-year term it would be 13.6%, and for a five-year term it would be 11.4%. For ten years, it would be 6.4%, and for 20 years, it would be 3.7%. Dunn and Harry provide an extensive table showing the premium to be added over a variety of time periods, base discount rates, and outcome probabilities. *See* Dunn & Harry, *supra* note 195, at 54.

[202] *Cf.* BREALEY ET AL., *supra* note 54, at 223 ("Managers often add fudge factors to discount rates [to account for project risk in capital budgeting decisions.] This sort of adjustment makes us nervous.")

wrong in the sense that it should serve as a basis for a *Daubert* challenge. Business people routinely use this as a quick-and-dirty method of valuing businesses, particularly small businesses, when relatively little money is at stake and predictions are necessarily imprecise. What is clearly wrong, however, is using a profit projection greater than the expected value and failing to add a sufficient premium to the otherwise applicable discount rate is clearly wrong.[203]

V. THE CASE LAW ON DISCOUNTING LOST PROFITS

A. Is Discounting Always Required?

Courts no longer question the need to discount future profits. As early as 1958, the Oklahoma Supreme Court recognized that when the measure of damages is the amount that will compensate the plaintiff for its loss, the undiscounted amount of profits lost is simply not the measure of the plaintiff's damages.[204] As the court put it:

> It is manifest from the record that if the amount awarded plaintiff is sustained he would recover for the value of the royalty due in later months and years, hence he would receive the use of the money in advance of the time he was entitled to recover it, and would gain more than he otherwise would by full performance of the lease contract.[205]

Other courts have stated the need to discount future profits in terms of avoiding unjust enrichment of the plaintiff.[206]

Too often, however, the parties to a lawsuit completely overlook the question of the discount rate and consequently fail to present any evidence in support of the discount rate. A federal district court in New Jersey went so far as to imply that the evidence of the proper discount rate to be applied is a necessary part of the plaintiff's burden of proving damages with a reasonable degree of certainty.[207] The court granted

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[203] *See* Yozzo & Eisenberg, *supra* note 3, at 38-39 (explaining increases to discount rate and reductions in expected value of cash flows as alternatives).

[204] Gallaspy v. Warner, 324 P.2d 848, 853 (Okla. 1958); *see also* Fin. Fed. Sav. & Loan Ass'n v. Cont'l Enters., Inc., 338 So.2d 907, 908 (D. Fla. 1976) (reversing damages judgment that did not include discounting).

[205] *Gallaspy*, 324 P.2d at 853.

[206] *See, e.g.*, Energy Capital Corp. v. United States, 302 F.3d 1314, 1330 (Fed. Cir. 2002). ("To prevent unjust enrichment of the plaintiff, the damages that would have arisen after the date of judgment ('future lost profits') must be discounted . . . .").

[207] Lith. Commerce Corp. v. Sara Lee Hosiery, 23 F. Supp. 2d 509, 517 (D.N.J. 1998) ("without such [evidence regarding the proper discount rate] a jury cannot determine lost profits").

the defendant judgment as a matter of law and included among numerous grounds the fact that the plaintiff had "failed to provide the jury with any evidence regarding the proper discount rate with respect to future profits."[208] It noted that "[w]ithout such information a jury cannot reasonably determine lost profits."[209]

Most courts have taken a less extreme position and have determined the discount rate on their own, most commonly using some sort of risk-free discount rate.[210] When trial courts have failed to discount future damages, some appellate courts have determined a discount rate and proceeded to calculate the discounted cash flow.[211] Others have remanded with instructions for the trial court to do the discounting.[212] In one case, the Oklahoma Supreme Court took the position that when no evidence has been presented as to the proper discount rate, the trial court should use the statutory judgment rate in discounting future profits lost because the defendant failed to operate oil wells as required under its lease.[213]

B. Is a Risk-Free Discount Rate Appropriate?

Plaintiffs often argue that lost profits should be discounted at a risk-free rate of interest. All of the economics literature requires the use of a risk-adjusted rate, as do almost all of the judicial opinions that consider the issue carefully. Nevertheless, many opinions, perhaps a majority of those that touch on the subject, can be read as authorizing the use of a risk-free rate. Appellate courts often refuse to scrutinize the discount rate, saying it is a question of fact to be decided by the trier of fact, while trial judges seldom exercise their gatekeeper function when it comes to the discount rate. Given the potential bias of experts hired and compensated by the parties,[214] this is

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[208] *Id.*

[209] *Id.*

[210] *See, e.g.*, Purina Mills L.L.C. v. Less, 295 F. Supp. 2d 1017, 1048 (N.D. Iowa 2003) (where parties did not suggest discount rate and state law provided no guidance the court discounted lost profits at a rate equal to the yield on treasury securities maturing at time profits would have been received).

[211] *See, e.g.*, *Gallaspy*, 324 P.2d at 853-54 (state supreme court discounted at judgment rate).

[212] *E.g.*, Fin. Fed. Sav. & Loan Assn. v. Continental Enters., Inc., 338 So.2d 907, 908 (D. Fla. 1976); Eden United, Inc. v. Short, 653 N.E.2d 126, 135 (Ind. Ct. App. 1995) (affirming on condition that the judgment be reduced or alternatively remanding).

[213] *Gallaspy*, 324 P.2d at 853.

[214] *See* DAVID H. KAYE ET AL., THE NEW WIGMORE: A TREATISE ON EVIDENCE–EXPERT EVIDENCE 341 (2004) (collecting and summarizing criticism of partisan expert witnesses); *see* Jonathan T. Tomlin & David R. Merrell, *The Accuracy and Manipulability of Lost Profits Damages Calculations: Should the Trier of Fact be "Reasonably Certain?"* 7 TENN. J. BUS. L. 295, 304 (2006) (financial experts may expect more business if they provide results favorable to client).

unacceptable. Courts need to have some basis for determining when the expert is making a reasoned professional judgment and when they are simply blowing smoke–trying to convince an unsophisticated trier-of-fact to accept an unrealistic number for calculation of damages.

Fortunately, a few economically-sophisticated judges have thought carefully about the discount rate issue and have written opinions that other courts should look to for guidance. One of the best opinions is Judge Frank Easterbrook's dissenting opinion in *Fishman v. Estate of Wirtz*.[215] Although the case is factually a little different from the model we have discussed, Easterbrook's approach applies the same discounting principles.

Fishman arose out of the 1972 sale of the Chicago Bulls basketball team to Chicago Professional Sports Corporation ("CPSC"), an entity whose owners included George Steinbrenner III, Lamar Hunt, and Arthur Wirtz, owner of the Chicago Coliseum.[216] A competing bidder, Illinois Basketball, Inc. (IBI), claimed that the tactics CPSC used to defeat IBI's competing bid violated both the Sherman Act and Illinois common law.[217] Both the district court and the Seventh Circuit majority agreed with IBI's claim.[218] To calculate damages, the district court used the yardstick method, a common way of calculating lost profits.[219] The yardstick method determines the profits the plaintiff lost on account of the defendant's wrongful act by comparing the plaintiff's actual profits after the defendant's wrongful act with the profits of a business similar to that of the plaintiff but not subject to the defendant's wrongdoing. This business is the "yardstick."[220] The assumption underlying this analysis is that but for the defendant's acts, the plaintiff's profits would have been similar to those of the yardstick (after any necessary adjustments such as size, customer base, and the like). *Fishman* was unusual, however, in that the yardstick was the defendant's business.

The district court hypothesized that if the defendants had not interfered, IBI would have bought the Bulls and enjoyed the same success that CPSC did.[221] To

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[215] 807 F.2d 520 (7th Cir. 1986).

[216] *Id.* at 525.

[217] *Id.* Interestingly, IBI submitted a written bid of $3.3 million and "that same day the Bulls' Executive Committee recommended that IBI's offer be accepted because IBI was willing to pay all cash at closing." *Id.* at 526. After a committee member informed CPSC of the bid, CPSC reopened negotiations. *Id.*

[218] *Id.* at 529-30, 562.

[219] *Id.*

[220] *Id.* at 547-48.

[221] *Id.*

calculate IBI's lost profits, the court determined the value of all of CPSC's assets (primarily the team) at the time of trial and subtracted from this the corporation's liabilities and the net contributions made to it by its shareholders.[222] Next, the district court subtracted the "opportunity cost" that IBI would have incurred if it had purchased the team.[223] The court calculated the opportunity cost by multiplying the equity capital IBI's shareholders would have had to invest in IBI by the time this capital would have remained invested and applying to this figure the yield on three-month United States Treasury bills, "the most nearly riskfree security on the market."[224]

The Seventh Circuit majority explained that even though this was not the normal application of the yardstick method, the basic methodology was nevertheless acceptable.[225] The majority did, however, take issue with the district court's use of the T-bill rate.[226] The majority saw the question as one of mitigation of damages. The plaintiff had a sum of money it would have invested in the team but for the defendants' actions.[227] Having been deprived of the opportunity to buy the team, the plaintiff could not let that money sit idle indefinitely but had to use it productively.[228] The amount that the money could have earned by investing should be considered an item of mitigation, reducing the plaintiffs' damages.[229] The majority noted that the district court's model assumed IBI could have left the money invested in T-bills for approximately ten years it said, "could encourage the immobilization of capital for a long period while antitrust damages were being sought."[230] The majority said that after "a preliminary period of several years during which the funds are left in treasury bills," the model should assume they were invested in a riskier investment but that "this estimate [of the return on the riskier investment] should, if anything, err on the side of conservatism since the

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[222] *Id.* at 548 (noting that the court based its finding on (1) IBI and CPSC's "similar investment objectives for the Bulls; and (2) the financial success of the Bulls during the relevant ten years was not 'attributable to any skill or resource contributed to the business by CPSC.'").

[223] *Id.*

[224] *Id.* at 550.

[225] *Id.* at 551.

[226] *Id.*

[227] *Id.*

[228] *Id.*

[229] *Id.* at 558-59.

[230] *Id.* at 559.

alternative may be to force undue risks on a victim of wrongdoing."[231] The majority then reasoned that "the cost of equity in IBI's Bulls investment would be at least as high as the cost of debt."[232] On that basis, the return from an alternative investment should be at least the prime rate of interest charged by banks plus one-half percent.[233]

In his dissenting opinion, Judge Easterbrook disagreed with the majority on nearly every issue.[234] After arguing that the defendant committed neither an antitrust violation nor a common law tort,[235] Easterbrook argued that regardless of the outcome on the liability issue, the plaintiffs were entitled to no damages because they had lost no profits.[236] In Easterbrook's analysis, the most the plaintiffs had lost was the opportunity to buy the team.[237] If the team had been worth more than the $3.3 million contract price, the difference would have been their damages.[238] The fact that the value of the team increased over the next ten years is irrelevant to what the team was worth at the time IBI tried to buy it.[239] The best measure of value is what knowledgeable buyers were willing to pay for it, and the team attracted three bids, all in the neighborhood of $3.3 million: "The best guess is that the Bulls were worth what the bidders were offering. Fishman and IBI therefore lost no bargain element, no unique opportunity, in 1972, and they have no damages."[240]

What is relevant for our purposes is that Easterbrook went on and stated that there would be no lost profits recovery at all "if CPSC's costs of doing business were computed accurately and subtracted from the cash flows, and if all elements of value

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[231] *Id.*

[232] *Id.*

[233] *Id.* The majority declined to adopt defendants' argument that because IBI's owners had contracted to borrow their equity contributions at an interest rate set at 3% over the prime rate, that interest rate was an appropriate opportunity cost, but it said "on remand the district court is at liberty to bear this factor in mind to the extent it may deem it relevant and appropriate." *Id.*

[234] *Id.* at 568-85.

[235] *Id.* at 563-78.

[236] *Id.* at 578 ("A firm that is prevented from purchasing productive assets has none of the usual losses.").

[237] *Id.*

[238] *Id.* at 579.

[239] *Id.*

[240] *Id.* (footnote omitted).

attributable to CPSC's efforts were stripped from the computation."[241] Easterbrook focuses most of his attention on the cost of capital and suggests that because of the risks of the business, the investors "are entitled to 15 or 20% return."[242] Using this return as the cost of capital, he concludes, would be enough to wipe out all the lost profits in the district court's calculations.[243] Easterbrook goes on to characterize the district court's unsupported assumption that the cost of capital was the risk-free rate as "a fantastic assumption."[244]

Easterbrook concludes his discussion of the discount rate by answering the majority's assertion that, in determining the discount rate, the court should err on the low side because the plaintiff is not required to take undue risks to mitigate damages. He agrees that the plaintiff should be given the benefit if the issue is mitigation, but he concludes that mitigation is not the issue: "We are simply trying to calculate CPSC's true 'profits,' net of its full costs of doing business."[245] In calculating these, Easterbrook asserts, the true cost of capital must be used.[246]

Although Easterbrook's opinion is a dissenting opinion, it is especially noteworthy because he is widely respected for his economic expertise. In a recent book about the way scholars at the University of Chicago revolutionized economics, Belgian economist Johan Van Overtveldt describes Easterbrook, who taught at Chicago's law school, as an "important player" in Chicago's economics-based approach to antitrust law.[247]

Richard Posner, a judge even more highly regarded as an economist and considered one of America's greatest legal scholars,[248] has also made it clear that future

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[241] *Id.*

[242] *Id.* at 580.

[243] *Id.* at 580-81 ("The difference between the risky rate of interest and the safe, T-Bill rate accounts for more than the entire award of lost profits in this case.").

[244] *Id.* at 581.

[245] *Id.* at 582.

[246] *See id.* ("If damages are to be computed from discounting cash flows … the calculation of the flows should use as the cost the interest CPSC would have paid, without guarantee, for all of its capital.").

[247] JOHAN VAN OVERTVELDT, THE CHICAGO SCHOOL 212-13 (2007).

[248] *See id.* at 305 (quoting Nobel Prize-winning economist George Stigler's description of Posner as ". . . the brilliant lawyer (and excellent economist) . . . who almost single-handedly created the field of economic analysis of law."); *see also*, Daniel T. Ostas, *Post-Modern Economic Analysis of Law: Extending the Pragmatic Visions of Richard A. Posner*, 36 AM BUS. L.J. 193 (1998).

earnings must be discounted for risk.[249] As one of a number of reasons for reversing a jury verdict in favor of an entertainer whose nude pictures had been published in *Hustler* magazine, Posner said:

> [T]he economist failed to correct for the extreme riskiness of the earnings stream for which he was trying to find a present value. An award of damages is a sum certain. If it is intended to replace a stream of earnings that is highly uncertain–surely an understatement in discussing earnings in the field of entertainment–then risk aversion should be taken into account in computing the discount (interest) rate. . . . This adjustment is needed to reflect the preference of a risk-averse individual for a smaller amount, received with certainty, to a larger expected amount that is subject to great uncertainty.[250]

Although one might argue that Judge Posner was not using "risk" in the technical sense in this opinion, he made it clear what he meant in a later case, *Price v. Marshall Erdman & Assoc., Inc.*[251]

In *Price*, the district court found that the defendants had fired Price, a salesman of medical buildings, on account of his age (45).[252] The Seventh Circuit upheld the district court's finding on liability, but remanded the case for recalculation of the damages.[253] In commenting on the damage calculation presented by the plaintiff's expert, Judge Posner first noted that the expert had merely multiplied the projected annual earnings if the plaintiff had remained employed by the number of years until projected retirement, and then discounted the figure to present value at the risk-free rate, without calculating an expected value.[254] This, he said, was wrong:

> A minor point is that the expert failed to discount (multiply) each year's projected earnings loss by the probability that Price would have lived long enough to obtain those earnings. The probability was not a

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[249] *See infra* text accompanying note 257.

[250] Douglass v. Hustler Magazine, Inc., 769 F.2d 1128, 1143 (7th Cir. 1985).

[251] 966 F.2d 320 (7th Cir. 1992).

[252] *Id.* at 322.

[253] *Id.* at 324, 327.

[254] *Id.* at 326.

> hundred percent and the estimate of lost earnings should have been scaled down accordingly.[255]

Posner then went on to criticize the expert for not discounting for risk. In the process, he gave a textbook explanation of the reasons courts must discount for risk:

> A bigger problem was the expert's failure to take into account the high volatility of a medical buildings salesman's earnings. The figures the expert projected may be the best possible estimate of Price's mean *expected* earnings had he remained with Erdman, but the variance around that mean must be considerable. Risk-averse persons–and most people are assumed to be risk-averse in their serious financial affairs–will pay a premium, often a very large one, to avoid risk. That is the rationale of insurance. The loading charge–the difference between the price of the insurance and its actuarial value (the loss insured against multiplied by the probability that the loss will occur)–is an approximate measure of what people are willing to pay to avoid bearing risk. For it is the part of the insurance premium that compensates the insurance company for its administrative and sales expenses, as distinct from the part which merely translates a possible future loss into a current expense; and therefore a person who did not mind risk would not be willing to pay a loading charge–he would prefer to take his chances on the loss's occurring or not. An award of front pay, however, like other monetary awards, is a lump sum certain, which the plaintiff can invest in as safe a vehicle as he pleases (short-term Treasury bills have zero default risk and a negligible risk of unanticipated changes in the rate of inflation). The award in effect enabled Price to exchange his risky expectations as a salesman of medical buildings for a risk-free asset having the same expected valued but, assuming Price is risk averse, a substantially higher utility. *A computation of damages that ignores the difference in risk between earnings in a volatile occupation and a judicial award of a lump sum equal to the present value of those earnings is unsound.*[256]

In contrast to these statements, the judicial authorities allowing the use of a risk-free rate are large in number but limited in their reasoning.[257] Many of these cases

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[255] *Id.* at 326-27.

[256] *Id.* at 327 (emphasis added).

[257] *See* PSKS, Inc. v. Leegin Creative Leather Prod., Inc., 171 F. App'x. 464, 470 (5th Cir. 2000), *cert. granted,* 127 S. Ct. 763 (2006) (allowing the use of risk-free discount rate with the statement that the discount rate is a question to be determined by the trier of fact); BGB Pet Supply, Inc. v. Nutro Prod., Inc., No. 96-1337, 1997 U.S. App. LEXIS 22451, at *31 (6th Cir. Aug. 19, 1997) (stating jury could

involve situations in which the defendant simply failed to contest the issue of the discount rate. *Purina Mills, LLC v. Less*[258] is a typical case. The parties concentrated their efforts on the question of whether the plaintiff was entitled to have its damages measured by the UCC's contract price-market price formula (UCC § 2-708(1)) or whether it was limited to lost profits, which in this case were less.[259] The court determined that the plaintiff was entitled to lost profits, and because neither party proposed a discount rate to be applied to future lost profits and the court found no Iowa statutory or case law specifying a discount rate to be used in this situation, the court applied the U.S. Treasury Maturity Index bond rates reported on the date closest to the judgment date.[260] In other words, for profits to be received at a given time in the future, the court discounted them at a rate equal to the yield on United States Treasury securities maturing at approximately the same time.[261] The court did not even mention the possibility of including a risk premium in the calculation.

One case formerly cited for the proposition that discounting at the risk-free rate is permissible or even required, *Northern Helex Co. v. United States,*[262] has been severely

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reasonably believe expert's testimony using risk-free 5% discount rate); Lee v. United States Taekwondo Union, No. 04-00461 SOM-LEK, 2006 U.S. Dist. LEXIS 25559, at *11-*12 (D. Haw. Jan. 26, 2006) (refusing to exclude testimony of economist who used 4% discount rate, saying the matter could be dealt with on cross-examination); Eden United, Inc. v. Short, 653 N.E.2d 126, 135 (Ind. Ct. App. 1995) (stating without supporting authority or reasoning that "the amount [of the award] should be that which, if invested for 10 years at appropriate (probably conservative) rates of return, would produce the amount of the loss").

In *Swierczynski v. Arnold Foods Co., Inc.*, 265 F. Supp. 2d 802 (E.D. Mich. 2003), the court said an expert's use of the 10-year T-bill rate for a discount rate goes to weight, rather than admissibility. *See id.* at 809-10. The court asserted that because a larger discount rate would reflect uncertainty, it is appropriate to throw that uncertainty on the wrongdoer. *Id.* This is the same reasoning Judge Easterbrook criticized in *Fishman*. *See supra* notes 239-53 and accompanying text.

[258] 295 F. Supp. 2d 1017 (N.D. Iowa 2003).

[259] *See id.* at 1029-47. It is not surprising that the parties concentrated on whether the contract-market formula should apply. Under the contract-market formula, the plaintiff claimed damages of $1.27 million (*id.* at 1030), whereas the lost profits the court actually awarded were less than one-fifth that amount. *Id.* at 1048.

[260] *Id.* at 1048.

[261] The court set out the discount calculations in a lengthy footnote. *Id.* It used annual discounting, discounting the profits that would have been received in the first year by 1.24%, those that would have been received in the second year by 1.85%, those that would have been received in the third year by 2.38% and those that would have been received in the fifth year by 3.17%. *Id.* Because the index contained no yield for securities maturing in the fourth year, the court averaged the third-year and fifth-year numbers and discounted these profits at 2.775%. *Id.* at 1048 n.20.

[262] 634 F.2d 557 (Ct. Cl. 1980).

limited by a later opinion. In *Northern Helex*, the trial judge in the old Court of Claims failed to discount the lost profits. The appellate panel held that discounting was required and applied a discount rate of 9%, which it said was "derived from currently available conservative investments."[263] The majority opinion did not mention the possibility of including a risk premium.[264]

Twenty years later, in *Energy Capital Corp. v. United States*,[265] the plaintiff's expert used a risk-adjusted discount rate of 10.5%.[266] The defendant's expert opined that the discount rate should be 25%.[267] Believing that *Northern Helex* required a risk-free rate, the trial judge took judicial notice of the 5.9% yield on 10-year Treasury notes and discounted the future profits at that rate.[268] His opinion, however, cited *Douglass* and other cases applying a risk-adjusted rate and expressly anticipated the possibility that the Federal Circuit might overrule *Northern Helex*.[269] The *Energy Capital* judge found as fact that if a risk-adjusted discount rate was mandated, then the proper risk-adjusted discount rate was the 10.5% rate used by the plaintiff's expert.[270]

On appeal, the Federal Circuit held that a risk-adjusted rate was required, but it did not overrule *Northern Helex*.[271] It simply read that opinion more narrowly than had the trial judge, saying:

> When there is no evidence in the record pertaining to the discount rate to be used when discounting a damages award, it certainly is appropriate for a court to apply a risk-free conservative discount rate to discount a

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[263] *Id.* at 564.

[264] The concurring opinion criticizes the majority's failure to consider the uncertainty inherent in a contract that had almost thirteen years left to run at the time of breach, saying: "This assumes . . . a certainty in the prediction of future events that we do not rely on in managing our own affairs." *Id.* at 565. This appears to be saying that the majority should have included a premium for non-occurrence in the discount rate. Beyond this, however, the concurring opinion offers no guidance as to the proper discount rate.

[265] 302 F.3d 1314 (Fed. Cir. 2002).

[266] *Id.* at 1330-31.

[267] *Id.* at 1331.

[268] *Id.* at 1332.

[269] *Id.*

[270] *See Energy Capital Corp.*, 47 Fed. Cl. at 418.

[271] Energy Capital Corp. v. United States, 302 F.3d 1341, 1333 (Fed. Cir. 2002).

> damages award to present value. That does not mean, however, that a conservative discount rate is legally mandated in every case.[272]

The Federal Circuit discounted the damages at the 10.5% rate used by the plaintiff's expert.[273]

Other opinions that courts and commentators have cited for propriety of a risk-free rate do not really stand for that proposition. A close reading of these sources reveals they should be limited to their particular facts. *American List Corp. v. U.S. News & World Report, Inc.*[274] is good example of this genre. U.S. News repudiated a contract to rent mailing lists from American List.[275] After a bench trial, the trial court awarded American List approximately $1,500,000 in damages.[276] In discounting the lost profits to present value, the trial court used what it characterized as a "realistic discount factor of 18%."[277] The court of appeals said that "in adopting the 18% figure, [the trial court] necessarily credited the testimony of the defendant's expert as to the valuation of the risk that the plaintiff would be unable to perform the contract in the future."[278] The court said that this calculation was wrong because in anticipatory repudiation cases, there is an irrebuttable presumption that the non-breaching party will be able to perform.[279] It remitted the case to the trial court for "a determination of the appropriate discount factor to be applied and a recalculation of damages."[280]

The *American List* Court believed (correctly or incorrectly, it is impossible to tell from the information available) that the 18% discount rate was based on the uncertainty as to whether the plaintiff would have received the profits had the defendant not repudiated.[281] This is not what this article has been referring to as "risk." Rather, to

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[272] *Id.* at 1333-34 (footnote omitted).

[273] *Id.* at 1334.

[274] 549 N.E.2d 1161 (N.Y. 1989).

[275] *Id.* at 1163.

[276] *Id.* (noting that the award "constituted the balance due Plaintiff on the contract for the years 1985-1994).

[277] *Id.*

[278] *Id.* at 1165.

[279] *Id.*

[280] *Id.* at 1166.

[281] *Id.* at 1165 (discussing the possibility of anticipatory repudiation).

avoid the very confusion this opinion caused by calling it risk, I have been referring to this factor as the "premium for non-occurrence."[282] For this reason, the case should not be read as requiring the use of a risk-free discount rate, but only as prohibiting the consideration of the premium for non-occurrence in cases where the defendant had anticipatorily repudiated a contract. Even if the case was read to require a risk-free discount rate, the court's reasoning makes it very clear that its holding applies only to anticipatory repudiation cases.

C. How Should the Risk Premium Be Determined?

Beyond saying that *some* premium above the risk-free rate should be added to the risk-free discount rate, case law offers little guidance. Even in *Energy Capital*, in which the Federal Circuit required a risk-adjusted discount rate, the court failed to examine the way in which the discount rate was determined. The appellate court noted that at trial the plaintiff's expert had testified that the discount rate should be 10.5%, while the defendant's had testified that it should be 25%.[283] After noting that the trial court rejected the defendant's expert's rate because it found his methodology "far from credible," the Federal Circuit Court's opinion states without further explanation: "We hold that [the plaintiff's expert's] proposed risk-adjusted discount rate of 10.5[%] is the appropriate discount rate to be used in this case."[284]

In many cases, probably most of the large ones, the question whether the cost of capital is the appropriate metric to use does not come up because both parties use sophisticated experts who know it is the proper metric and who would not risk their professional reputations arguing otherwise.[285] *Energy Capital* appears to be a good example of this situation. However, the case was complicated by the fact the defendant's action had ended the plaintiff's business in the early stages.[286] This made it difficult to determine what the cost of capital would have been. There were other companies already resembling the plaintiff, so both experts chose a discount rate reflecting the average cost of capital for the type of business that they thought was most comparable to the business the plaintiff would have had but for the defendant's

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[282] *See supra* Part IV.C.5.

[283] Energy Capital Corp. v. United States, 302 F.3d 1341, 1332 (Fed. Cir. 2002).

[284] *Id.* at 1332.

[285] One experienced forensic economist notes that high discount rates are common in business cases: "[I]n commercial litigation, . . . discount rates seem to begin about ten percent to twelve percent, and in many instances they are in the fifteen percent to twenty-five percent or higher range." Sliwoski, *supra* note 99, at 167.

[286] *Energy Capital,* 302 F.3d at 1319.

actions.[287] The trial judge found that the plaintiff's expert's choice of a comparable business was more reasonable, and the Federal Circuit did not disturb this finding.[288]

A later Court of Federal Claims case, *Franconia Assoc. v. United States*, presented another twist on the question of selecting a risk-adjusted discount rate.[289] The federal government had established a program under which the Farmers' Home Administration ("FmHA") made loans to private entities to allow them to develop low-income housing in rural areas.[290] Each borrower was required to enter into a loan agreement that contained provisions designed to ensure that the properties did in fact remain low-income housing.[291] The program restricted rental rates for eligible tenants and limited the profit that the borrower could earn while in the program to 8% of its initial investment.[292] The term of the loan was generally forty to fifty years, but the borrower could prepay the loan at any time and free itself from the program's restrictions, including the restriction on profits that could be earned.[293] Later, Congress passed additional legislation restricting the borrowers' rights to prepay and terminate the restrictions on their properties and their profits.[294] The Court of Federal Claims determined that this action constituted a breach of contract by the federal government and that the plaintiffs were entitled to recover the profits they had lost on account of the congressional action as damages.[295]

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[287] *Id.* at 1331.

[288] *Id.* at 1334.

[289] 61 Fed. Cl. 718 (Fed. Cl. 2004).

[290] *Id.* at 722 (citing Parkridge Investors Ltd. v. Farmers' Home Admin., 13 F.3d 1192, 1195 (8th Cir. 1994).

[291] *Franconia*, 61 Fed. Cl. at 722.

[292] *Id.* ("For example, an owner who made a $100,000 down payment on a project with a $1,000,000 mortgage, would earn only a maximum of $8,000 per year as long as it remained in the program-regardless of how much equity the owner accumulated over time and how the property's market value increased."). *Id.* at n.4.

[293] *Id.* at 722-23 ("This prepayment option served as a major inducement for recruiting property owners into the program: the option not only benefited the program participants, who viewed the program as a way to acquire equity in a building that would eventually be converted to market rents, but also the FmHA, which through these participants was able to provide needed housing.").

[294] *Id.* at 723-25 ("In 1979, Congress found that the increasing number of … participants prepaying their mortgages threatened the continued availability of rural low-and moderate-income housing.").

[295] *Id.* at 740.

To calculate the damages, the court had to determine the present value of the profits the plaintiffs would have been able to earn without the new restrictions and subtract from that the present value of the profits the plaintiffs could be expected to earn with the restrictions in place.[296] To do this, the court constructed two models (hypothetical businesses) and determined the future profits each would be expected to earn.[297] Because the two models were in reality two different types of businesses with one (the "unrestricted model") operating in the free market and other (the "restricted model") having both advantages and disadvantages on account of its participation in the government program, they presented differing amounts of risk.[298] Therefore, the two income streams had to be valued using different discount rates.

This put the parties in a rather unusual position. With respect to the unrestricted model, it was in the government's interest to argue for a high discount rate, and it was in the plaintiffs' interest to argue for a low one. With respect to the restricted model, their positions were reversed. Both parties' experts based their discount rates on the cost of capital, which they determined to be the returns that investors would require to own and operate the properties in question.[299] Because the federal subsidies and restrictions made the income of the restricted model less volatile, it was obvious that this model should have the lower discount rate, but it was not obvious how much the difference should be.[300] The plaintiffs' expert testified that the discount rate in the restricted model should be 11% and that in the unrestricted it should be 11.5%, whereas the government's expert testified that the spread should be 18 times as large, with the restricted model having a discount rate of 6% (roughly 1% above the risk-free rate) and the unrestricted model having a discount rate of 15%.[301]

The court accepted the plaintiffs' 11% discount rate for the restricted model.[302] It reasoned that while 11% might seem a high rate for a program in which the government subsidies virtually guaranteed a profit, the government had twice repudiated

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[296] *Id.* at 735-36.

[297] *Id.* at 758.

[298] *Id.*

[299] *Id.* at 764-65.

[300] *See id.* at 764 ("Dr. Karvel convincingly testified that the extraordinarily low rate of return associated with the relatively small cash flows of the complexes in the section 515 program would lead investors to demand a premium for loaning funds in a comparable market scenario. Dr. Hamm did not disagree with this premise.").

[301] *Id.*

[302] *Id.*

its obligations under the program and had thereby introduced a risk for which suppliers of capital would demand to be compensated.[303] As to the unrestricted program, the court adopted a discount rate closer to that used by the government's expert.[304] The court based its analysis on the Korpacz Real Estate Investor Survey, upon which both experts had relied to some extent and which, according to the court, "bills itself as 'the industry's standard source of up-to-date capitalization and discount rates.'"[305] The plaintiffs' expert used this source, which listed an 11.51% discount rate for "institutional-grade" properties in unlevered (all-cash) transactions.[306] The court determined that the properties in question more closely resembled "non-institutional grade" properties, for which the source gave an average discount rate of 13.01% for unlevered transactions.[307] The court also thought that if the owners did pay off the government loans, then they would most likely obtain another loan with which to do so.[308] Where the property was subject to a loan, the Korpetz Real Estate Survey called for an additional premium of 0.94%, so the court added that and used a discount rate of 14%.[309]

In a number of other reported cases, there was no need to get into the issue of the proper rate because both parties' experts used discount rates that were reasonable in terms of the standards specified in the professional literature. To calculate the lost profits for a pair of highly-successful restaurants run by a respected restauranteur, the plaintiff's expert used variable discount rates which increased from 16% to 36% as the earnings projections stretched farther into the future.[310] In a patent infringement case, the plaintiff's expert used a discount rate of 19.4%.[311] He derived this by determining

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[303] *Id.* at 764-65.

[304] *Id.*

[305] *Id.* at 765.

[306] *Id.*

[307] *Id.*

[308] *Id.*

[309] *Id.* at 765-66.

[310] *See* RAF Enters., LLC v. Trident LLC, No. A098529, 2005 Cal. Unpub. LEXIS 1248, at *2, *51 (Cal. Ct. App. Feb. 14, 2005). Increasing the discount rate as the projections stretch further into the future is not often done in projections prepared for litigation, but it is quite appropriate because the further off the year in question is, the greater the likelihood that the actual earnings or cash flow will deviate significantly from the expected value. These discount rates seem particularly conservative given the fact the individual plaintiff (who was also the principal of the plaintiff firm) had been named by an industry newspaper as one of the six best restauranteurs in the United States. *See id.* at *2.

[311] *Id.*

that the rate of return for public companies was 14.4% and adding to that an additional 5% to compensate for the risk of the device in question.[312] In another example, two business school professors who prepared a damage analysis for a liquor distributor were comfortable enough with their analysis that they published it in a professional journal.[313] Significantly, they used the weighted average cost of capital as the discount rate, with the cost of equity capital calculated according to the capital asset pricing model.[314]

VI. *DAUBERT* AND THE DISCOUNT RATE

Because most jurisdictions consider the discount rate to be a question of fact subject to limited review, it is especially important that trial courts seriously take their responsibility as gatekeepers to exclude expert testimony that will mislead the jury. The Supreme Court explained that the objective of *Daubert's* gatekeeping requirement is "to make certain that an expert . . . employs in the courtroom the same level of intellectual rigor that characterizes the practice of an expert in the relevant field."[315] So, courts must exclude expert testimony that uses discount rates no competent person would use to make business decisions.

The choice of a discount rate is not purely a mechanical calculation. It usually requires a number of subjective judgments,[316] and experts need latitude to make these judgments, subject to cross-examination and criticism by opposing experts. Nevertheless, there are some basic principles on which all of the articles and papers in professional publications agree. These include (1) that using a risk-free discount rate will overcompensate the plaintiff and (2) that to properly calculate the loss, the risk premium must be based on the risk characteristics of the particular firm or project that suffered the loss.[317] Deviation from these basic principles should disqualify the expert.

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[312] Olson v. Nieman's Ltd., 579 N.W.2d 299, 312 (Iowa 1998).

[313] Allen Michel & Israel Shaked, *Valuation of Damage Claims: An Application of Corporate Finance,* 19 J. BUS. FIN. & ACCOUNTING 455 (1992).

[314] *See id.* at 457-60.

[315] Kumho Tire Co. v. Carmichael, 526 U.S. 137, 152 (1999).

[316] *See* BRIGHAM & DAVES, *supra* note 52, at 306 (analysts should use several methods and if they give differing results, use judgment to determine which result to use); Jacobson, *supra* note 3, at 3-4 (listing reasons subjective judgment is involved in calculating cost of equity capital); Yozzo & Eisenberg, *supra* note 3, at 38 ("The determination of a debtor's weighted average cost of capital . . . is a highly subjective exercise . . . ."); *see also* Bridas S.A.P.I.C. v. Turkmenistan, 345 F.3d 347, 364-65 (5th Cir. 2003) ("Present-value determinations are not an exact science; competent experts and competent arbitrators can adopt highly divergent opinions without being deemed incorrect as a matter of law.").

[317] *See, e.g.*, Boudreaux et al., *supra* note 13, at 2-3 ("All estimated cash inflows and outflows must be discounted to present value at an appropriate rate of return which reflects the relative riskiness of the cash

Although no expert will deviate from these principles in a publication that will be read by the expert's peers, many experts seem to deviate from them when testifying in court on behalf of a paying client. Unfortunately, jurors do not find it easy to understand the economics involved. Nor can jurors be sure when an expert is being honest and when he is just trying to earn a fee. Although a judge may also be uncertain, a judge who has taken the time to become acquainted with the analytical tools presented in this article will be able to spot the most serious abuses. When they do, the judge needs to exclude the testimony.

When judges fail to exclude testimony that uses an unreasonable discount rate, they penalize the honest expert and the honest lawyer. They create incentives for experts to use discount rates they would never think of using outside of litigation and for lawyers to hire the experts that will take the most extreme positions.

The only way to avoid Gresham's law that drives honest expert testimony out of the marketplace is for courts to be serious about their gatekeeping function when they look at the discount rates the experts use. To date, they have not done this. In one of the few opinions to even discuss the issue, a district court in the Seventh Circuit rejected a *Daubert* challenge based in part on the fact that the expert used a risk-free discount rate.[318] The court cited Judge Posner's Seventh Circuit opinions in *Douglass* and *Price*, and said, "the court agrees with defendant and plaintiff that risk must be taken into account in calculating lost profits" and that the failure to use a risk-adjusted rate "may leave [the expert's] opinion in some doubt."[319] Nevertheless, the court relied on the usual clichés about the expert's opinion being subject to cross-examination and contrary opinion and denied the defendant's motion in limine.[320]

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flows, as well as the required rate of return to the stakeholders of the business."); Fisher & Romaine, *supra* note 133, at 150 (lost profits must be discounted at "a discount rate that includes a risk premium suitable to the risks involved"); Jacobson, *supra* note 3, at 6 (discount rate should be appropriate to the risks of the project giving rise to the damage claim); Lanzillotti & Esquibel, *supra* note 2, at 130 (because plaintiff is not bearing risk, damages should be discounted at risk-adjusted rate); Shefftz, *supra* note 112 (assuming throughout that risk-adjusted discount rate will be used); Sliwoski, *supra* note 103, at 169 (given the risk associated with future profits and the requirement of making the plaintiff whole, discounting at the weighted average cost of capital is appropriate).

[318] Tuf Racing Prods., Inc. v. Am. Suzuki Motor Corp., No. 94 C 50392, 1998 U. S. Dist. LEXIS 8331 (N.D. Ill. Jun. 3, 1998).

[319] *Id.* at *4.

[320] *See id.* at *6. Interestingly, the plaintiff prevailed at trial and the defendant's subsequent appeal was heard by a Seventh Circuit panel that included Judge Posner. *See* Tuf Racing Prods., Inc. v. Am. Suzuki Motor Corp., 223 F.3d 585 (7th Cir. 2000). Judge Posner's opinion did not discuss the discount rate issue, possibly because the jury awarded only slightly more than a tenth of what the expert said was the value of the lost profits. *See id.* at 588*; see also* Lee v. United States Taekwondo Union, No. 04-00461 SOM-LEK, 2006 U.S. Dist LEXIS 25559, at *11-*12 (D. Haw. Jan. 26, 2006) (refusing to exclude testimony of an

VII. CONCLUSION

As anyone who has been following the recent economic news knows, modern finance revolves around the concept of risk–buying it, selling it, measuring it, hedging against it. In valuing lost profits, the courts have been slow to understand concepts that financial people have been using for many years. A few sophisticated courts have begun to do it, and it is time for the rest of the American judicial system to get on board.

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economist who used 4% discount rate and explaining the matter could be dealt with on cross-examination).