INTELLECTUAL PROPERTY VALUATION: A FINANCE PERSPECTIVE

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I. INTRODUCTION: FINANCE, FINANCIAL MODELING, AND THE LAW

The close relationship between law and economics has been recognized for more than four decades. Starting with the work of the British economist and 1991 Nobel prize winner Ronald Harry Coase, in his article *The Problem of Social Cost*,[1] and current Judge Guido Calabresi of the United States Court of Appeals for the Second Circuit, in *Some Thoughts on Risk Distribution and the Law of Torts*,[2] this relationship became formalized into the field of Law and Economics.[3] Today, there are centers of Law and Economics[4] throughout the legal academy both in the United States and throughout the world, and at least ten journals are dedicated to the subject. Now, with Law and Economics as a mature discipline, accepted as a regular part of the law school curriculum, attention is focusing on the relationship between law and the related—but different—field of Finance, and how constructs from that field have

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[1] R. H. Coase, *The Problem of Social Cost*, 3 J.L. & ECON. 1 (1960).

[2] Guido Calabresi, *Some Thoughts on Risk Distribution and the Law of Torts*, 70 YALE L.J. 499 (1961). *See also* GUIDO CALABRESI, THE COSTS OF ACCIDENTS: A LEGAL AND ECONOMIC ANALYSIS (1970), which is a very important work in the law and economics tradition because it provides an economic efficiency analysis of the rules of tort law.

[3] Historically, it has been associated with the University of Chicago and Professor, and now Judge, Richard A. Posner of the United States Court of Appeals for the Seventh Circuit. *See* RICHARD A. POSNER, ECONOMICS OF JUSTICE 4 (1983); Richard A. Posner, *Foreword* to 1 ENCYCLOPEDIA OF LAW AND ECONOMICS, at xii (Boudewijn Bouckaert & Gerrit De Geest eds., 2000).

[4] The University of Chicago Law School remains prominent for its Law and Economic center among others.

important relevance to the law.

Finance, originally a subfield of Economics, has grown exponentially, and, since the 1970s, has become increasingly sophisticated so that it has become differentiated from economics in general, and, academically, has moved from the Economics departments of universities to play a significant role as a distinct, independent field of study in business schools. Today, Finance, with its foundation in mathematical and statistical modeling, has taken on special prominence, particularly with respect to issues of asset valuation.

The field of Finance as a whole is not easily defined. A careful analysis, however, will lead to the realization that almost all significant activity in the field is driven by one encompassing goal: to find an efficient, accurate, and palatable way to evaluate what an asset is worth at a given time, a task that requires one to grapple with serious limitations and to operate within an array of questionable assumptions. Finance professionals have long struggled with the problem of evaluating an asset in a way that accounts for the uncertainty arising from the risk inherent in the asset's performance, the overall market conditions, and their performance interrelationship within the parameters of an assumed or assumable time-period. The core of the analytic task—and the reason the field of Finance has become so mathematically sophisticated— lies in the development and application of financial models of general applicability. Two such financial models, the Capital Asset Pricing Model (CAPM)[5] and the Black Scholes Option Pricing Model (BSOPM),[6] were the basis for Nobel prizes awarded to their creators[7], and are now the most well-known and established asset valuation models, at least in part because of their extreme efficiency of use notwithstanding some theoretical limitations. Innovations such as these in the development of asset valuation models, that at the time were a dramatic departure from accepted valuation principles, had an enormous impact on the development of the field of Finance. These constructs, whether causatively or

[5] William F. Sharpe, *Capital Asset Prices: a Theory of Market Equilibrium Under Conditions of Risk*, 19 J. FIN. 425 (1964).

[6] Fischer Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 J. POL. ECON. 637 (1973) (representing Black and Scholes' original paper).

[7] William Sharpe shared the Nobel Prize in Economics in 1991 for his role in the development of the CAPM. Myron Scholes and Robert C. Merton received the 1997 Nobel Prize in Economics for the BSOPM and related work; Fischer Black was ineligible, having died in 1995.

correlatively, coincided with the recognition of Finance as a field independent of Economics and of particular importance to business and business schools, and the prominence of Finance in the business curriculum over the last quarter of a century.

Prior to the prevalence of these more sophisticated constructs, finance researchers were grappling with different approaches to the problem of evaluating an asset in a way that accounted for its various inherit risks, and quantified it originally as the standard variation of assets' returns, also known as volatility. Originally, the main concept and the initial basic building block of asset valuation was the concept of Present Value; central to this analysis is the realization that the asset value changes over time, and that change is driven by different factors. What earlier models failed to do is to evaluate how that particular change is correlated to the asset's risk and the market's risk in which this asset is traded; and integrate into their analysis the quantified risk ("volatility") in a way more comprehensive and realistic than simply consideration of statistical standard deviations. As the process evolved, CAPM theoreticians were able to quantify risk in a more sophisticated form, as the correlation of the asset's return with the market, and denominated it as beta (β). With the focus on risk, Present Value analysis becomes more sophisticated, incorporating in a model not only the concept of time value, but also a measure of returns in relation to risk in evaluating an asset. The CAPM ability to quantify risk—to give it a number (albeit a shaky one)—has made it important and useful, and despite its theoretical limitations, has been applied very successfully to various financial valuation situations. Variations and enhancements on the CAPM have been developed since its inception, and today its application in models such as the NPV, EVA, and WACC[8] is recognized as more significant and powerful than other comparative evaluations.

Although sophisticated financial modeling and risk analysis developed outside the lawyers' discipline, lawyers have found it increasingly necessary to incorporate some of these financial concepts and models into their work as litigators and client counselors. Problems of valuation, whether for assessing damages or structuring complex transactions, cannot be dealt with

[8] Net Present Value is a model that uses the present value concept together with the CAPM return as its discount value to value projects. The Equity Valuation Model and the Weighted Average Cost of Capital each use the CAPM return in their formula to determine the cost of equity.

meaningfully without an understanding of financial modeling. Similarly, judges must deal with various "expert opinions" producing conflicting valuations, and must necessarily feel overwhelmed by the complexity and apparent inconsistency of these evaluations. In frustration, a judge may resort simply to a Solomonic, "cutting the baby in half" approach as the solution.[9] Despite those limitations, the important finance models are the most useful tools the courts and lawyers have, as of today, dealing with valuation issues, and use of these models in litigation is increasing significantly. With time, as more people learn to use those models and are able to consider their limitations more pragmatically, they will gain more and more overall court acceptance. The table below, a simple count of the number of reported opinions making reference to CAPM or Black and Scholes, shows the increasing judicial acceptance and understanding of these models.

Years	CAPM	B&S
1970-1975	0	
1975-1980	6	
1980-1985	9	1
1985-1990	9	5
1990-1995	26	7
1995-2000	28	16
2000-2005	26	33
2006	9	11

Table 1

Although there has been a general increase in awareness and use of finance models by lawyers and judges in dealing with problems of asset valuation, issues of valuation of copyrighted works are particularly troublesome because of the array of circumstances in which valuation questions can arise, the different, separable components of a copyright interest, and the unique nature of individual works.[10] Theoretically, given the fact that a copyright endures for a limited term, it should be possible—even if actuarial

[9] *See, e.g.*, BTR Dunlop Holdings, Inc. v. Comm'r, 78 T.C.M. (CCH) 797 (1999). In this case, involving value of an enterprise, the different finance experts valued the company at $49.8 million, $20 million, and $21 million, with the courts deciding on $31 million. *Id.* at *4–*5.

[10] *See, e.g.*, GORDON V. SMITH & RUSSELL L. PARR, INTELLECTUAL PROPERTY: VALUATION, EXPLOITATION, AND INFRINGEMENT DAMAGES 259 (2005).

tables need to be consulted to estimate the life of the "author" of a work—to make appropriate assumptions as to the duration of the copyright for a specific work. The "time" element of a model for projecting value on its face thus can be determinable, but a reasonable estimate of the life of a copyright on a work does not really help in determining a realistic time period for useful market exploitation of that work.

The problem of "time" is but one element of serious uncertainty. For example, in the case of damages for infringement of copyright, section 504(a) of the Copyright Act[11] creates an alternative damages scheme. Subject to the statutory limitations, one suing for copyright infringement may elect to recover provable damages, including the infringer's profits, or to recover, without proof of actual harm, specified statutory damages.[12] As to provable damages, the Copyright Act authorizes the recovery of provable damages, attributable to the defendant's conduct, of the harm done to the copyrighted work. Such damages, of course, would include provable profits lost by the plaintiff and the nonduplicative profits received by the defendant.[13] It has been held that "Section 504(b) permits a copyright owner to recover actual damages, in appropriate circumstances, for the fair market value of a license covering the defendant's infringing use."[14] How does one determine "the fair market value of a license covering the defendant's infringing use?"[15] What model should be used to project the future (lost) profits of a given infringed work?

Similarly, outside of the litigation/infringement problems of valuation, is the continuing matter of valuing a given work for purposes of sale or license of rights to that work. Copyright law and the various rules and limitations apply to an almost infinite array of works. Motion pictures, songs, photographs, unique individual paintings and sculptures, computer programs, choreography, and television commercials all may be protected by copyright,[16] yet there

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[11] 17 U.S.C. § 504(a) (2000).

[12] *Id.* ("[A]n infringer of copyright is liable for either—(1) the copyright owner's actual damages and any additional profits of the infringer . . . or (2) statutory damages . . . .")

[13] 17 U.S.C. § 504(b) provides: The copyright owner is entitled to recover the actual damages suffered by him or her as a result of the infringement, and any profits of the infringer that are attributable to the infringement and are not taken into account in computing the actual damages.

[14] On Davis v. Gap, Inc., 246 F.3d 152, 172 (2d Cir. 2001).

[15] *Id.*

[16] See, for example, 17 U.S.C. § 102(a) (2000), which contains an exemplary listing of "works of authorship" that include the following categories:

is no overall valuation scheme universally applicable. Even that complication is further complicated by the fact that valuing a work for purposes of sale or assignment of all rights to that work is necessarily different from valuing a license for a specific use of the work (or damages for infringement of specific subsets of the copyright interest). As the Copyright Act provides, copyright is not a unitary concept, but a bundle of distinct, separable rights.[17] Each of the rights exists independently of the others. Each may be exercised independently of the others and each may be transferred, assigned, divided, and subdivided independently of the others. Thus, valuing a motion picture for determining an appropriate license fee for theatrical exhibition distribution rights involves market determinations different from simply selling all rights to that motion picture. Determining what is an appropriate license fee for displaying an artwork in the course of a television program is a radically different exercise from determining what damages flow from the wholesale copying and distribution of that work, which, again, is different from the market value of the work underlying purchase of all rights to it by a museum.

One can more readily understand the complexity by comparing the early Congressional approach to compulsory licenses with the more recent examples. Thus, the oldest of the compulsory licenses, that for so-called mechanical reproduction (i.e., the making of a "cover" recording of a copyrighted work) provides simply for a uniform, Congressionally determined (and periodically modified) fee

(1) literary works;
(2) musical works, including any accompanying words;
(3) dramatic works, including any accompanying music;
(4) pantomimes and choreographic works;
(5) pictorial, graphic, and sculptural works;
(6) motion pictures and other audiovisual works;
(7) sound recordings; and
(8) architectural works.

[17] See, for example, 17 U.S.C. § 106 (2000), which vests in the copyright owner the exclusive right:

(1) to reproduce the copyrighted work in copies or phonorecords;
(2) to prepare derivative works based upon the copyrighted work;
(3) to distribute copies or phonorecords of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending;
(4) in the case of literary, musical, dramatic, and choreographic works, pantomimes, and motion pictures and other audiovisual works, to perform the copyrighted work publicly;
(5) in the case of literary, musical, dramatic, and choreographic works, pantomimes, and pictorial, graphic, or sculptural works, including the individual images of a motion picture or other audiovisual work, to display the copyrighted work publicly; and
(6) in the case of sound recordings, to perform the copyrighted work publicly by means of a digital audio transmission.

per recording.[18] Here the assumption is that the greater value of a more popular song will be recognized by the volume of sales rather than through the rate. On the other hand, as distribution has become more sophisticated and digital transmission becomes at least as prevalent as the sale of individual recordings, a different scheme is required, and the Copyright Act essentially hopes that the matter of valuation can be resolved either by industry agreement or by arbitration proceedings.[19] Similar problems, precluding application of a "one rate fits all" solution, are seen in the inordinately complex and vague provisions covering adjudication proceedings contemplated for disbursement of royalties for performances via cable television and for licenses for sound recording performances.[20]

In short, valuation for copyrighted works immerses one into an area of great complexity and uncertainty. Nevertheless, complexity and uncertainty have long been part of sophisticated financial modeling techniques, and despite these formidable obstacles, financial analysis and modeling applicable in many other areas of asset valuation can play a significant role in valuing copyrighted works in the various contexts in which the issue arises.

II. FINANCIAL MODELS AND INTELLECTUAL PROPERTY: THE TOOLS

A copyrighted work (and the collection of rights as part of the copyright) is an asset, an intangible asset, but an asset nonetheless. There are many ways to evaluate this asset. The literature on copyright valuation considers three types of evaluations that particularly seem to dominate the field of intellectual property valuations:[21] the Cost Approach, considering the "cost" of replacing an asset; the Market Approach, essentially an auction-type appraisal; and the Income Approach, a model-driven, present valuation of a stream of future income derived from the asset over a defined period of time discounted at some rate (preferably a variation derived CAPM rate).

The Cost Approach, the more basic and intuitive of the three, is based on the concept of replacement cost, where the marketplace becomes the valuator. There is no financial modeling behind this

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[18] 17 U.S.C. § 115(c)(2) (2000).

[19] *See, e.g.*, *id.* § 115(c)(3).

[20] See, for example, the extraordinarily complex provisions of 17 U.S.C. §§ 111, 114 (2005).

[21] *See* SMITH & PARR, *supra* note 10, at 255.

approach; it is totally market driven. It is similar in scope to real estate valuation. That is, although no two houses are alike, you can derive information from the sale price of similar properties sold in the near past within the surrounding market as to the probable value of the house you are trying to price. For certain kinds of intellectual property, e.g., computer software, determining replacement value can be meaningful in determining what the software is "worth." The problem with this direct market replacement analysis is, apart from the lack of any relevant financial modeling, that it does not consider the concept of time value of money.[22] Therefore, this approach has meaning essentially where there is a record of recent sale of a similar asset.

Market forces exclusively drive the Market Approach, requiring easily determinable buyers and sellers. It is based on an auction model, where the market sellers and buyers determine the price. The Market Approach works only in an active market (e.g., stock traded daily in large volume as opposed to thinly traded penny stock) and it does not seem to be very useful for intellectual property valuation. Rather, the Income Approach, based more on finance fundamentals and risk analysis, is more useful for copyright valuation.

The Income Approach is the one that will be analyzed in this paper since it considers the potential income generating capabilities of an asset, takes into consideration the "time value of money," and the final valuation is driven by financial models. It is particularly suited for copyright valuation. Moreover, with the success of the CAPM when applied in tax litigation, in assessing personal injury damages, and in various corporate asset valuation cases, it seems quite clear that the model would particularly fit into the Income Approach for intellectual property valuation.

The Income Approach takes into consideration all future/past cash flows (*CF*) that are derived from exploiting the property, the time span (*t*) in which these cash flows will occur, and the discount rate (*r*) that will account for the inherent risk in the variability of the cash flows. It is driven by the CAPM.

To understand this type of evaluation we need to understand each building block. The basis of the analysis is the concept of Present

[22] Time Value of Money ("TVM") is a way of calculating the value of a sum of money, at any time in the present or future. The microeconomic idea is that giving up consumption today "entitles" you to have more to consume tomorrow, a form of compensation. A dollar not spent today is worth $1*(1+r)$ in the next period.

Value: the present value (*PV*) is the value today of a stream of cash flows to be paid in the future. In order to generate present value it is necessary to know the cash flows that will occur and when they will occur. To bring the evaluation to "today's" dollars, we need to incorporate a discount rate that will be used to discount each of the cash flows adapted to the passage of time. Thus, one future cash flow formula can be stated as $PV = CF_t / (1+ r)^t$, where:

PV is the present value of the Future Value payment to be received discounted to today,

CF is the net amount to be received in the future at time "t" (future value (FV)),

t is the number of years until payment is received, and

r is the discount rate.

For multiple cash flows, the formula is $PV = \sum CF_t / (1+ r)^t$, where:

PV is the present value of all future payments to be received discounted,

$\sum$ is a summation function that indicates the addition of each discounted cash flow,

CF is the net amount assumed to be received in the future at different times "t,"

t is the number of times adapted yearly in which these cash flows will occur, and

r is the discount rate.

The present value/future value relationship is fundamental to evaluating cash flows at different times, and the two components are mathematically and structurally interrelated. If you give up consumption today and save $100 (*PV*) you should be compensated in the next period for saving at some predetermined rate. Let's assume that rate is 5% a year, then you should receive $105 (*FV*) next year. The $100 is the portion you saved and the $5 is your compensation. From a different perspective, you can evaluate how much a $100 (*FV*) gift that you will receive a year from now is worth today. Considering the same 5% rate, it will be worth only $95.24 (*PV*) today.

Discounted cash flow (DCF) is a more sophisticated evaluation that involves discounting the future generating net cash flows of a project, asset, or even a company to the present using a discount rate adjusted for risk (also referred to as "cost of capital"). The discounting process is essential since in principle a dollar today is

not the same as a dollar tomorrow or anytime in the future. However, this system also takes into consideration the risk, the uncertainty, associated with receipt of the assumed cash flows in the future. In order to determine the total value today we need to bring all the future cash flows down to today's value, discounted by a risk-adjusted rate. This process requires: generating future cash flows (*CF*); determining the life span (*t*) of the asset; and evaluating the discount rate (*r*).

This process looks a lot simpler than it is. In fact, each of the elements contains its own uncertainty and relies on various, perhaps questionable, assumptions. These assumptions involve estimates as to the

- Amount of net future income and when it will occur,
- "Life" of the asset and its increments,
- Uncertainty (risk) involved in receiving the cash flows, and
- Availability and appropriateness of comparative benchmarks (industry standards) and market information.

Only after adopting the appropriate assumptions, can we then generate the cash flows and discount rate, and apply them to the appropriate formula.

The Net Present Value (*NPV*) model (which also involves the discount rate generated via the CAPM) takes the process a step further by including in the analysis the total cost of the project that can occur at the onset and/or any other time interval during the life of the project. In finance, a project is considered "viable"[23] if it has a positive *NPV*, which implies that the present value of all the future cash flows generated from the project are higher then the total cost.

Finally, evaluation of an asset requires future forecasting. We "assume" what type of cash flows the asset will generate and how that cash flow will change from year to year. We then need "to define" the life of the asset, in terms of how long the cash flow will come in (for which purpose forecasting infinity is not a problem). Generating the risk adjusted discount rate (*r*) is accomplished by using the CAPM model and the formula $E(r_i) = r_f + \beta_i * (E(r_m) - r_f)$, where:

$E(r_i)$ is the return generated through the CAPM model,

r_f is the risk-free rate (usually a comparative treasury bond rate),

$E(r_m)$ is the expected return on the market,

[23] Meaning it adds value to the shareholders or other stakeholders.

β_i is the beta which is generated through a regression; it can be generated or "lifted" from industry data bases of "twin"[24] assets, and is defined as the risk measurement of the correlation of the returns of the asset with the returns of the market[25] or the sensitivity of the asset returns to the market.

III. APPLYING FINANCE MODELING: THE CHARGING BULL

In order to fully appreciate the power and difficulties inherent in the use of sophisticated finance models to intellectual property valuation, it will be helpful to apply it to evaluate the copyrighted work in a specific 2006 copyright infringement case, the action brought by Arturo de Modica in the Federal District Court for the Southern District of New York against Wal-Mart and others for infringement of his copyright interest in the well-known Wall Street Charging Bull statue.

Mr. Di Modica is an Italian sculptor who lives in New York City. He created a sixteen-foot-long, 7,000 pound, solid bronze sculpture depicting a charging bull that he, with the help of some of his friends, deposited (apparently illegally) in the dead of night on December 15, 1989 in the Wall Street area near the New York Stock Exchange as a symbol of hope following the market crash of 1987. The sculpture took two years to complete and it is assumed to have

[24] "Twin" is a reference to a company that closely relates to the one you are evaluating and that has available market data that you can use for that analysis.

[25] The market is usually a market that sustains comparability with the asset being evaluated.

cost him about $350,000 in materials.[26] The Charging Bull became quite popular and is now generally perceived as an icon of Wall Street and a favorite tourist spot; apparently, Wall Street employees and other investors rub his nose for good luck. Mr. Di Modica registered the Bull with the United Stated Copyright Office in 1998. He subsequently tried, without success, to sell his Bull for $5,000,000 in 2004 with the stipulation that it stay on Wall Street.[27] On September 16, 2006, he sued for copyright infringement[28] after Wal-Mart started selling framed photos of the Bull on its website (taken by one Igor Maloratsky); the price of the photo with framing was $135.27.[29]

A. "Charging Bull" Cost Evaluation

Using the present value/future value relationship we presented previously we can assess what the cost of the Bull to Mr. Di Modica should be in 2006. We can start by looking at the out-of-pocket cost of producing the Bull in 1989, presumably (from the published reports) $350,000. To this must be added the intangible "value" of his two years of labor and his artistic interpretation of the charging bull. If there were databases of sculptor's fees and other market prices of sculptures that size, produced by Mr. Di Modica or even any other sculptor, that intangible cost determination would be relatively easy. Instead, without the database, assumptions must be made, and for these purposes, it is assumed (conservatively) that the intangibles would add an additional $150,000 to arrive at a total "cost" for the Bull of $500,000 in 1989 when he "dropped" it on Wall Street. With that assumption, it is necessary to determine how much $500,000 in 1989 is worth in October, 2006 (without considering tax liabilities). We can say that if that amount had instead been invested conservatively at the United States Treasury

[26] *Bull Sculpter Sues Wal-Mart, Others to Protect its Image*, GRAND RAPIDS PRESS, Sept. 25, 2006, at B5. However, this cost seems to change with every interview with the press. *See generally* Randy Kennedy, *Sculptor Files Lawsuit Against Wal-mart*, N.Y. TIMES, Sept. 23, 2006, at B8 (discussing the Bull and Mr. Di Modica's lawsuit against Wal-Mart).

[27] *You Can Buy $5M 'Steak' in Wall St.*, N.Y. POST, Dec. 21, 2004, at 5.

[28] The named defendants are North Fork Bancorporation, Inc., Wal-Mart Stores, Art.com, Photoframesplus.com, Bruce Teleky, American Vision Gallery, Bluestone Designs, Igor Maloratsky, Martin Securities, and "John Doe," "Jane Doe," and "XYZ Corporation." Complaint at 1, Di Modica v. North Fork Bancorporation, Inc., No. 06 Civ. 7210 (S.D.N.Y. Sep. 20, 2006).

[29] The advertisement for the framed Charging Bull photo was taken off the web after the suit was filed.

annual yield[30] (the "risk-free rate") for the years in question in 2006 Mr. Di Modica would have had $1,313,284:

Date	t-note yield	Investment Value
2-Jan-90	0.0843	$500,000
2-Jan-91	0.0803	$542,150
2-Jan-92	0.0731	$585,685
4-Jan-93	0.0639	$628,498
3-Jan-94	0.0564	$668,659
3-Jan-95	0.0759	$706,372
2-Jan-96	0.0558	$759,985
2-Jan-97	0.0650	$802,392
2-Jan-98	0.0551	$854,548
4-Jan-99	0.0465	$901,633
3-Jan-00	0.0667	$943,559
2-Jan-01	0.0518	$1,006,495
2-Jan-02	0.0503	$1,058,631
2-Jan-03	0.0397	$1,111,880
2-Jan-04	0.0414	$1,156,022
3-Jan-05	0.0436	$1,203,881
3-Jan-06	0.0453	$1,256,371
2-Oct-06	0.0479	$1,313,284
Value in 2006		$1,313,284

Table 2

B. Charging Bull's IP Valuation

Table 2 uses the risk-free interest rate and Present Value formula to calculate the amount that would be available if the sculptor did not use the money and other resources to create the Bull. This is one way to define the "cost" of the Bull. The analysis that followed is not designed to measure Mr. Di Modica's damages, were he successful in his claim with respect to the specific acts of infringement. Rather, we use financial modeling to determine what kind of income would be generated if, in settlement of the claim, Wal-Mart were to buy the Bull from Mr. Di Modica (considering the "cost" analysis above as the starting point) and use it to generate various items for sale like the photograph in question. The next step then is to approximate the kind of cash flows that could be generated by owning the copyright interest in the Bull. This requires several assumptions about cash flows, time to maturity,

[30] U.S. Treasury one year notes, as quoted by the financial markets.

and the discount rate.

We are not trying to evaluate how much the Bull image is adding to the value of items sold by Wal-Mart. We are not analyzing cash flow that would be generated from using an asset by adding a logo.[31] We are assuming that Wal-Mart has bought the copyright to the Bull image and it is exploiting the image of the Bull in various forms. Assume for these purposes that Wal-Mart had a photograph taken of the Charging Bull,[32] printed it and framed it, and subsequently advertised it for sale on its website for $135.27.[33] That is the gross sales price—the cost to the customer that must be adjusted to determine Wal-Mart's net cost. In order to evaluate a simplified version of the net cost we need to make some assumptions of what the "cost of the goods sold" (COGS) is. For simplicity we assume that the cost of the goods sold, in the case of a framed picture, is thirty percent of the total cost.[34] So too, it is necessary to assume a sales volume, and an estimate of 1,000 units sold first year, with a 4% yearly growth in sales, to be conservative enough.

The "time to maturity" evaluation—the period of exploitation—is more complicated. We certainly can assume that Mr. Di Modica, as the copyright owner of the Bull, would be able to exploit his rights for his lifetime plus seventy years.[35] Mr. Di Modica was born in 1941 (he was sixty-five years old in 2006), so let us assume conservatively that he will live an additional six years,[36] for a total possible exploitation period of seventy-six years. This, of course, assumes both that the sculpture itself will survive that long and people will continue to be interested in the image of the Bull. In fact, a much shorter exploitation period would be more realistic.

The discount rate is the most complicated component to determine. The CAPM model is particularly important to generate a discount rate that would be appropriate based on a sophisticated

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[31] For example, one can buy a plain polo shirt ($26) at Nordstrom's or a similar polo shirt (La Coste) with an alligator on it ($75). The alligator adds $49 in value. Nordstrom, http://www.nordstrom.com (last visited Mar. 24, 2007).

[32] Apparently, the photo in question actually was taken by Igor Maloratsky, but for simplicity we will assume that Wal-Mart has the rights of the photographer.

[33] Wal-Mart took the photo off its website shortly after the lawsuit was filed.

[34] There are financial databases that can facilitate the evaluation of this variable cost by using comparable market benchmarks. For simplicity we are also ignoring any additional business fixed cost and taxes.

[35] *See* 17 U.S.C. § 302(a) (1978) (fixing the duration of copyrights at "the life of the author and 70 years after the author's death").

[36] Actuarial tables could help in evaluating his probable life span.

analysis of the limited information we have. Without real market information, we will assume conservatively that a thirty-year Treasury bond (the bond with the longest maturity) that has a yield of 4.99% will provide the risk-free rate; similarly, we could collapse the CAPM formula by assuming a risk-free beta of 0.

In order to make it more interesting we can assume that in three years after commencement of the sale of photos, Wal-Mart decides to sell a t-shirt with the Charging Bull logo in front that would sell for $16.95, with a 60% COGS sold and an original volume of 5,000 units, and with, again, a conservative growth in sales of 4% yearly. Two years later Wal-Mart might introduce some Charging Bull mugs for $4.95, with an 80% cost of goods sold and a volume of 10,000 units, and with the same conservative yearly growth of 4%.[37] With all "this information" we can create a "what if" analysis that can be adjusted for each of the inputs. The following tables demonstrate just how a change in the discount rate can dramatically alter the ultimate cash flow result analysis. Table 3 shows only the relevant part of such an extended evaluation, using the basic risk-free rate of 4.99%, for simplicity 5%, while Table 4 uses a different rate that includes "risk" quantified arbitrarily with an additional 5% for a total of 9.99% or, for simplicity, 10%:

[37] All these numbers are made up for the purpose of generating a numerically rich example.

Photo print of Charging Bull														
Wal-Mart selling price														
Value available	price per unit	$135.27												
Assumptions														
yearly growth in sales	growth%	0.04												
1st year units sold		1,000											continue to year 2082	
cost to wall mart	COGS %	0.3												
	years	76	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
	Total Sales			$135,270	$140,681	$146,308	$152,160	$158,247	$164,577	$171,160	$178,006	$185,126	$192,531	$200,233
	COGS %			$40,581	$42,204	$43,892	$45,648	$47,474	$49,373	$51,348	$53,402	$55,538	$57,759	$60,070
	Net Sales			$94,689	$98,477	$102,416	$106,512	$110,773	$115,204	$119,812	$124,604	$129,588	$134,772	$140,163
model driven	Discount rate	0.05												
	PV		$4,893,315											
T-shirt of Bull														
	price per unit	$16.95												
	growth%	0.04												
1st year units sold		5,000												
	COGS %	0.6												
	Total Sales					$84,750	$88,140	$91,666	$95,332	$99,146	$103,111	$107,236	$111,525	$115,986
						$50,850	$52,884	$54,999	$57,199	$59,487	$61,867	$64,341	$66,915	$69,592
	Net Sales					$33,900	$35,256	$36,666	$38,133	$39,658	$41,245	$42,894	$44,610	$46,394
	Discount rate	0.05												
	FV					$570,871								
	PV		$493,140											
Mugs of Bull														
	price per unit	$4.95												
	growth%	0.04												
1st year units sold		10,000												
	COGS %	0.8												
			Total Sales					$49,500	$51,480	$53,539	$55,681	$57,908	$60,224	$62,633
								$39,600	$41,184	$42,831	$44,545	$46,326	$48,179	$50,107
	Net Sales							$9,900	$10,296	$10,708	$11,136	$11,582	$12,045	$12,527
	Discount rate	0.05												
	FV							$492,943						
	PV		$386,234											
	TOTAL PV		$5,772,690											
Value of Bull in 2006	$1,313,284													

Table 3

Information																					
Photo print of Charging Bull																					
Wall Mart selling price																					
Value available	price per unit	$135.27																			
Assumptions																					
yearly growth in sales	growth%	0.04																			
1st year units sold		1,000																			
cost to wall mart	COGS %	0.3																			
	years	76	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017							
	Total Sales			$135,270	$140,681	$146,308	$152,160	$158,247	$164,577	$171,160	$178,006	$185,126	$192,531	$200,233							
	COGS %			$40,581	$42,204	$43,892	$45,648	$47,474	$49,373	$51,348	$53,402	$55,538	$57,759	$60,070							
	Net Sales			$94,689	$98,477	$102,416	$106,512	$110,773	$115,204	$119,812	$124,604	$129,588	$134,772	$140,163							
model driven	Discount rate	0.1																			
	PV		$1,555,925																		
T-shirt of Bull																					
	price per unit	$16.95																			
	growth%	0.04																			
1st year units sold		5,000																			
	COGS %	0.6																			
	Total Sales					$84,750	$88,140	$91,666	$95,332	$99,146	$103,111	$107,236	$111,525	$115,986							
						$50,850	$52,884	$54,999	$57,199	$59,487	$61,867	$64,341	$66,915	$69,592							
	Net Sales					$33,900	$35,256	$36,666	$38,133	$39,658	$41,245	$42,894	$44,610	$46,394							
	Discount rate	0.1																			
	FV					$521,554															
	PV		$391,852																		
Mugs of Bull																					
	price per unit	$4.95																			
	growth%	0.04																			
1st year units sold		10,000																			
	COGS %	0.8						$49,500	$51,480	$53,539	$55,681	$57,908	$60,224	$62,633							
	Total Sales							$39,600	$41,184	$42,831	$44,545	$46,326	$48,179	$50,107							
	Net Sales							$9,900	$10,296	$10,708	$11,136	$11,582	$12,045	$12,527							
	Discount rate	0.1																			
	FV							$162,092													
	PV		$100,646																		
	TOTAL PV		$2,048,423																		
Value of Bull in 2006	$1,313,284																				

Table 4

In a "what if" financial analysis we set up the numerical assumptions in a way that enable us to change one number and see what that change will do to the "bottom line," in this case the cell

labeled "Total PV." The cells' inputs are connected by interrelated equations; as a result, every change to one of the numbers in the original assumptions produces a chain reaction through the whole spreadsheet, affecting all the numbers and readjusting the final evaluation number—the Total PV.[38] The only difference between Table 3 and Table 4 is the model-driven discount rate: a discount rate of 5% (what we labeled as "risk free" earlier) results in a Total PV of $5,772,690 while a discount rate of 10% (which assumes a higher risk) results in a Total PV of only $2,048,423. Any small change in the discount rate can cause a substantial increase or decrease in the Total PV; for example, reducing the rate only 100 basis points to 4% results in a total PV of $7,999,948, a differential of over $2 million. Increasing the rate by only 100 basis points to 6% results in a total PV of $4,367,896, a differential of over $1 million. The discount rate and final Total PV are inversely related, indicating that the higher the discount rate (the higher the risk),[39] the lower the Total PV, and vice versa.

IV. CONCLUSION

The Charging Bull cost and cash flow analysis involves many assumptions. In practice, the assumptions used would be the result of a much greater, deeper, and extended analysis to provide a more solid foundation than in this hypothetical situation. Such a systematic analysis of the available data and the market trends that affect or historically affected that data would provide support for the underlying assumptions to which the models are applied. The rather simplistic assumptions, not so grounded, made for purposes of this paper, are used simply to show that, in dealing with the difficult and elusive problem of evaluating a copyrighted work, financial models are available and, within their limitations, can provide a useful starting point for analysis.

Certainly, such a simplified analysis does not itself generate the amount of damages which may be owed to Mr. Di Modica for alleged

[38] Monte Carlo simulation is a more sophisticated way of enhancing this feature, producing predictable numerical ranges. *See* Weston Anson, *Introduction* to CARMEN EGGLESTON, VALUATION OF NONCOMMERCIALIZED TECHNOLOGY: UNDERSTANDING INTELLECTUAL PROPERTY RIGHTS AND VALUE CONTRIBUTION, in FUNDAMENTALS OF INTELLECTUAL PROPERTY VALUATION: A PRIMER FOR IDENTIFYING AND DETERMINING VALUE 120, 125 (Weston Anson & Donna Suchy eds., 2005).

[39] Risk is measured by beta. The higher the value of beta is, the higher the total of the value of the CAPM equation, and thus the discount rate, will be.

infringement, or reliably tell us exactly what the image of the Bull is worth to Wal-Mart. On the other hand, it does show how finance modeling provides tools that, with a sufficiently sophisticated foundation and reliable data, can go a long way toward solving valuation problems. Ultimately, the accuracy and utility of evaluation results generated by these models depends upon the availability of sufficient experiential data to support the underlying assumptions. It can be an interesting exercise, like this one, to make these assumptions in a vacuum, but for the models to really work it requires a systemic change in available data with respect to copyright and other intellectual property transactions. For copyright, there is a central registry, in the Copyright Office of the Library of Congress, but it does not now serve as a data repository. Such a repository of disclosed market copyrighted transaction information would in time provide the historical data upon which valuable and efficient forecasting tools, financial valuation models, could be meaningfully applied. Available information can help us find "twins," and create market benchmarks for comparative evaluation analysis that will help us generate relevant and applicable discount rates or capitalization rates. With respect to copyright evaluation, and determination of cost and value for specific acts of infringement or for asset transfer or license, enormous benefit would flow from the existence and availability of a comprehensive database of copyright-related transactions. Historical data, freely available, with market information, would do much to enhance predictability and consistency in the application of sophisticated financial evaluation models to the field of copyright and more generally to matters involving intellectual property valuation.