2022 Delaware Views from the Bench

Valuing the Difficult Asset

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2022

ABI Delaware Views from the Bench: Valuing the Difficult Asset

Laura Davis Jones, Evan Miller, Norm Pernick (moderator) Ret. Judge Christopher S. Sontchi, J. Scott Victor

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I. Valuation & the Bankruptcy Code:
   A. Adequate Protection of Secured Creditor's Interest – 11 U.S.C. § 361
      i. Sections 362, 362, and 364 require adequate protection be provided to certain creditors
      ii. Adequate Protection packages may include cash payment, periodic cash payments, additional or replacement liens, entitlement to an administrative expense claim under § 503(b)(1), indubitable equivalent of its interest in the property, and such other relief
      iii. To the extent the debtor's use of collateral results in a decrease in the value of such entity's interest in the property
   B. Sale of All or Substantially All of Debtor's Assets – 11 U.S.C. § 363
      i. The trustee may sell property free and clear of any interest if the price at which the property is to be sold is greater than the aggregate value of all liens on such property
      ii. Where there is a stalking horse bidder, debtor must use valuation methods to determine which bid is highest and best – *In re Hertz* involved competing bids
   C. Secured Creditor's Interest in Collateral – 11 U.S.C. § 506
      i. An allowed claim of a creditor secured by a lien on property in which the estate has an interest is secured to the extent of the value of such creditor's interest in the estate's interest in such property and is an unsecured claim to the extent the value of the creditor's interest is less than the amount to its allowed claim
      ii. Value shall be determined in light of the purpose of the valuation and of the proposed disposition or use of such property, and in conjunction with any hearing on such disposition or use or on a plan affecting such creditor's interest
   D. Plan Confirmation – 11 U.S.C. §§ 1127, 1129
      i. With respect to each impaired class of claim or interests each holder will receive or retain under the plan on account of such claim or interest property of a value, as of the effective date of the plan, that is not less than the amount such holder would receive or retain if the debtor were liquidated – 1129(a)(7) – Best Interest of Creditors Test
      ii. Court may only confirm a plan over a dissenting class's vote, if the debtor establishes by a preponderance of the evidence that the plan is fair and equitable with respect to the dissenting class – § 1129(b)(1) – Cramdown
      iii. Plan must be fair and equitable with respect to a class – § 1129(b)(2) – Absolute Priority Rule
         1. For secured claims: holders retain the liens to the extent of the allowed amount of such claims and each holder receives deferred cash payments totaling at least the allowed amount of such claim, of a value, as of the effective date of the plan, of at least the value of

such holder's interest in the estate's interest in such property; in a sale, the liens attach to the proceeds of sale; or holder realize the indubitable equivalent of such claims
2. For unsecured claims: each holder of a claim receives or retains on account of such claim property of a value, as of the effective date of the plan, equal to the allowed amount of such claim; or holder that is junior to the claims of such class will not receive or retain under the plan any property on account of such junior claim
3. For interests: each holder receives or retains on account of such interest property of a value, as of the effective date of the plan, equal to the greatest of the allowed amount of any fixed liquidation preference to which such holder is entitled, any fixed redemption price, or the value of such interest; or junior holders of interest will not receive or retain under the plan on account of such junior interest any property

iv. Feasibility: plan confirmation not likely to be followed by the liquidating or the need for further financial reorganization – § 1129(a)(11)

E. Avoidance Actions / Debtor's Solvency – 11 U.S.C. §§ 101(32), 547, 548
   i. Insolvent means: the sum of an entity's debts is greater than all of its property, at a fair valuation, exclusive of property transferred, concealed, or removed with intent to hinder, delay or defraud creditors and exempt property
   ii. The trustee may avoid certain transfers made while the debtor was insolvent
   iii. The trustee may avoid any transfer if the debtor voluntarily or involuntarily received less than a reasonably equivalent value in exchange for such transfer or obligation

II. Valuation Methodologies[1]:
   A. Fair Market Value:
      i. The price at which property would be change hands between a willing buyer and a willing seller when the former is not under any compulsion to buy and the latter is not under any compulsion to sell, with both parties having reasonable knowledge of relevant facts [I.R.S. Rev. Rul. 59-60, 1959-1 C.B. 237]
      ii. Should be expressed in cash as a hypothetical arm's length transaction in an open and unrestricted market
   B. Asset Based Valuation:
      i. Calculate the value of individual assets owned by a company then add their values
      ii. Liquidation value: aggregate estimated sale proceeds of the assets owned by the company
      iii. Replacement cost: estimate what it would cost to replace all of the company's assets that it owns today

[1] *See generally* Hon. Christopher S. Sontchi, *Valuation Methodologies: A Judge's View*, 20 Am. Bankr. Inst. L. Rev. 1, 1 (2012).

C. Discounted Cash Flow ("DCF") Valuation: value equals the present value plus the present value of expected future cash flows – attempts to discern intrinsic value
    i. Present value of a delayed payoff is determined by multiplying the payoff by a discount rate, the more risk involved, the higher the discount rate used
    ii. Valuing just the equity stake: discount expected cash flows (dividends) to equity (shareholders);
    iii. Valuing the entire company (equity and other claimholders): discount expected cash flows to the company – residual cash flow after meeting all expenses and needs but before paying debt or equity holders at the weighted average cost of capital (WACC – cost of different components of financing used by company) – most common methodology used in bankruptcy courts
    iv. Valuing the company in pieces beginning with operations and adding effects of debt and non-equity claims on value: adjusted present value (APV) value equity in the firm, value added/subtracted by debt
    v. Terminal value: the remaining value of the company after the period during which the cash flow was projected – calculate as a multiple of the company's terminal EBITDA (or other metric)

D. Relative Valuation: looks to the market; figure out a metric by which to value the company (EBITDA) then determine the appropriate multiple to apply to the metric to calculate value
    i. Comparable company: look at trading ranges of similar publicly traded companies; the more similar companies are, the more useful the analysis is
        1. Last twelve months EBITDA / market cap (stock price x # of shares) = the multiple
        2. Take subject company's last twelve moths EBITDA and multiply it by the multiple to calculate its value
    ii. Comparable transaction: examine the money paid for a similar entity in a public merger or acquisition
        1. Purchase price is a multiple of EBITDA or EBIT
        2. Value = multiple x subject company's EBITDA or EBIT

E. Contingent Claim: DCF tends to undervalue assets that provide payoffs contingent upon occurrence of an event
    i. Appropriate for example with a pharmaceutical start up waiting for regulatory approval before taking its product to market

III. Expert Witnesses/*Daubert* Considerations:

A. FRE 401: evidence is relevant if it has any tendency to make a fact more or less probable than it would be without the evidence; and the fact is of consequence in determining the action

B. FRE 402: relevant evidence is admissible (unless the U.S. Constitution, federal statute, FRE, or other rules from SCOTUS exclude it)

C. FRE 702: a witness who is qualified as an expert by knowledge, skill, experience, training, or education may testify in the form of an opinion or otherwise if
    i. The expert's scientific, technical, or other specialized knowledge will help the trier of fact to understand the evidence or to determine a fact in issue;
    ii. Testimony is based on sufficient facts or data;

iii. Testimony is the product of reliable principles and methods; and
iv. Expert has reliably applied the principles and methods to the facts

D. *Daubert*: trial court plays the role of gatekeeper and must ensure that expert testimony is both relevant and reliable
   i. Relevant: does the evidence fit into the scope of the questions presented in the case
   ii. Reliable: court focuses on whether the expert's conclusions are generated by a reliable methodology – courts look at
      1. Sources of facts and data employed by expert; and
      2. Any systematic bias in forming the opinion
E. Selecting the Expert: due diligence – has the witness testified before this Judge, about this industry/sector, these types of assets
F. Retaining the Expert: use caution to maintain attorney client privilege and work product doctrine applicability

IV. Persuasive Presentation:
   A. Identify the Asset Whose Value Must Be Determined
   B. Identify the characteristics of the ownership interest
   C. Date of valuation
   D. Purpose of valuation: appropriate standard of valuing a company will depend on the facts and circumstances of each case; premise of value
      i. Going concern value
      ii. Collection of assets
      iii. Orderly liquidation
      iv. Forced liquidation
   E. Identify assumptions being made
   F. Valuation method(s) used
      i. Income based: focuses on income generating potential – DCF
      ii. Market based: comparable company; comparable transaction
      iii. Asset based: examine balance fees from book value to FMV
   G. Information Gathering
      i. Debtor's management's financials are often the starting point in valuation
      ii. Bankruptcy court docket
      iii. Publicly available information – publicly traded companies; EMMA – municipal bonds; federal/state regulatory agencies
      iv. Traditional discovery tools
   H. Adjustments: skepticism about expert adjustments to valuation permeates case law; they seem results driven
      i. Expert needs to be able to explain clearly why an adjustment is needed
      ii. On cross examination – expert must be prepared to defend the adjustment
   I. Credibility is Key
   J. Combatting Opposing Expert
      i. Witness didn't review enough material/the right material; witness is including outlier data points, therefore, conclusion is faulty
      ii. Witness made inappropriate adjustments/assumptions
      iii. Witness lacks expertise on this issue

iv. Witness is biased to over/under value

V. Delaware Case Reference Guide

A. *Matter of Genesis Health Ventures, Inc.*, 266 B.R. 591 (Bankr. D. Del. 2001): the disparate treatment between classes is a permissible allocation by the secured creditors of a portion of the distribution to which they would otherwise be entitled, rather than unfair discrimination against the dissenting classes by the proponents of the plan

i. General unsecured creditors received b/w 7%-8%
ii. Unsecured punitive damage claimants received 0%
iii. Although claims had the same priority, recoveries were based on the agreement of senior lenders to allocation their recoveries, this rebutted the unfairness presumption

B. *In re Exide Techs*., 303 B.R. 48, 65 (Bankr. D. Del. 2003): Judge Carey addressed competing valuations in a cramdown scenario

i. Debtors and Committee presented expert testimony on enterprise valuation and each used comparable company analysis, comparable transaction analysis, and discounted cash flow
    1. Debtors' valuation was between $950 million to $1.05 billion
    2. Committee's valuation was between $1.478 and $1.711 billion
ii. Comparable Company: key component is the EBITDA (earnings before interest, taxes, depreciation, and amortization) and the selection of an appropriate multiple to apply to the EBITDA to arrive at enterprise value
    1. Appropriate multiple is determined by comparing enterprise value of a comparable publicly traded company to the 12 months EBITDA
    2. Subjective assessment is required to select the comparable companies
iii. Comparable Transaction: an EBITDA multiple is determined from a recent merger and acquisition transaction in the industry and that multiple is then applied to the trailing 12 months of the debtor
iv. DCF: forward looking method that measures value by forecasting a firm's ability to generate cash; calculated by adding the present value of the company's distributable cash flows and the present value of the company's terminal value
    1. WACC: weighted average cost of capital – used to determine the discount rate; it's based on the rate of the cost of debt and cost of equity capital
    2. Committee used CAPM (capital asset pricing model)
    3. Debtor's expert said CAPM isn't always accurate for non-publicly traded companies; relied on the rate of return on equity a prospective purchaser would demand (market driven approach)
    4. Court: debtor's expert's subjective adjustments stray too far from generally accepted method of determining discount rate
v. After considering each party's incentive to over or undervalue, Court concluded the enterprise value was between $1.4 and $1.6 billion

vi. Court: plan cannot be confirmed because the record is insufficient; debtors need to present more evidence on whether classifying general unsecured claims and investor claims separately is reasonable and necessary and does not discriminate unfairly under 1129(b)(1)
    1. Plan undervalues the debtor and there may be sufficient value to pay the secured creditor in full
    2. Currently, the distribution to certain unsecured creditors is not merely a reallocation of the secured creditor's recovery
    3. A debtor may fairly discriminate among creditors based upon subordination rights – but the record is incomplete

C. *In re Coram Healthcare Corp.*, 315 B.R. 321 (Bankr. D. Del. 2004): Judge Walrath addressed competing plans from the chapter 11 trustee and equity committee
    i. Both determined the going concern value of the debtors by applying comparable public company analysis, comparable transaction analysis, and discounted cash flow analysis
        1. Experts included different assets, attached different weights to the methodologies, and took different positions on management's projections
        2. Court recognized incentives to over and under value; experts often disagree on the appropriate value even when using the same tools
        3. When it comes to valuation issues, reasonable minds can and often do disagree. This is because the output of financial valuation models are driving by their inputs, many of which are subjective in nature – *Peltz v. Hatten*, 279 B.R. 710, 736-37 (D. Del. 2002)
        4. Equity committee's assumptions were overly aggressive and optimistic, they ran afoul of *Exide*, therefore the Court accepted the Debtors' valuation
    ii. Equity committee's plan improperly provided one group of creditors with a separate classification; this had no effect on voting
    iii. Equity committee's plan lacks an accepting vote from an impaired class, and is not confirmable
        1. Plain impairment means the plan proponent alters the legal, equitable and contractual rights of a claimholder
        2. Statutory impairment happens when the operation of a provision of the Code alters the amount a creditor is entitled to under non-bankruptcy law
    iv. Court confirmed the chapter 11 trustee's plan, which enjoyed larger support; after noting the equity committee plan was not confirmable

D. *In re Armstrong World Indus., Inc.*, 348 B.R. 11 (D. Del. 2006): when assessing unfair discrimination under § 1129(b)(1), the bankruptcy court "ensures that a dissenting class will receive relative value equal to the value given to all other similarly situated classes"

E. *In re Nellson Nutraceutical, Inc.*, 2007 WL 201134 (Bank. D. Del. Jan. 18, 2007): Judge Sontchi held a 23-day trial to determine the enterprise value of the debtors – motion to determine value under § 506(a)
   i. Three experts presented reports to the Court, which were all based on debtors' managements' long range business plan – at trial it was overwhelmingly established this was not reliable; evidence established debtors' business continued to deteriorate and did not stabilize
      1. Court accepted the expert opinions and made adjustments after the trial
      2. Valuation methodologies presented: comparable companies, comparable transaction, and DCF
   ii. Courts frequently adjust expert opinion analysis when reaching their final opinion on valuation; expert testimony assists the trier of fact – it doesn't substitute the expert for the trier of fact
   iii. DCF: emergence risk premium may be appropriate to an estimate of earning capacity – being in bankruptcy will harm the company's market value
   iv. Discussion of witness credibility
      1. One witness was credible, but made some errors in reaching his conclusion, which indicated a predisposition to reaching a low valuation
      2. Second witness made some errors in DCF, but was extremely well qualified and the most credible – accredited valuation professional, member of American Society of Appraisers, master's degree in business administration
      3. Third witness was well qualified even without formal valuation training; was credible, but made some errors in reaching his conclusion, which indicate a predisposition for a low valuation

F. *In re PTL Holdings LLC*, 2011 WL 5509031 (Bankr. D. Del. Nov. 10, 2011): Judge Shannon addressed valuation in the context of a prepackaged reorganization plan, where the junior secured creditor believed the debtors' value was high enough to require a distribution to it
   i. Debtors' management prepared financial projections, which are the basis of the valuation fight
      1. Junior secured creditor argues these projections are unduly pessimistic and based on faulty assumptions
      2. Court disagreed
   ii. Both experts testified about DCF, comparable companies, and precedent transactions
      1. Debtors: between $76 and $102 million; with $89 million midpoint
      2. Junior secured creditor: between $119 and $159 million; $139 million midpoint
      3. Backdrop: valuation must hit or exceed $110 million for junior secured creditor to be in the money
   iii. Plan proponent must demonstrate elements of § 1129 are satisfied

1. Objecting party bears the burden of producing evidence to support its objection
2. Valuation is an inexact science; an estimate, as distinguished from mathematical certitude is all that can be made

iv. Court: debtors' valuation was prepared according to widely accepted methodologies and standards, it relied on properly prepared projections from management
   1. To the extent the rebuttal expert raised concerns with the debtors' experts' analysis, these were not significant enough to push value up above the $110 million threshold
   2. Debtors carried the burden of demonstrating plan was fair and equitable to warrant confirmation

G. *In re Emerge Energy Servs. LP*, 2019 WL 7634308 (Bankr. D. Del. 2019): Judge Owens had to consider whether the total enterprise value exceeded the aggregate outstanding obligations under the DIP, the revolving loan facility, and the notes purchase facility, if yes, then the plan cannot be crammed down
   i. Court had no market evidence – perhaps a marketing process would have made confirmation simpler, but it is not required
   ii. Court had to rely on the battle of the parties' valuation experts – both experts used the same valuation methodologies –
      1. Discounted Cash Flow: measures value by forecasting a firm's ability to generate cash by adding present value of the company's projected cash flows during the forecast period and the present value of the company's terminal value
      2. Comparable company: estimates the value of a company by using the value of comparable companies as an indicator of the subject company; rely on common variables, such as revenue, earnings, or cash flow with the expert applying a multiple of the financial metric to yield the market's valuation of these comparable companies
   iii. Although experts used same methodologies, they reached different conclusions – selection of disputed inputs by Debtor's expert resulted in a material decrease in value, while those of the Committee's expert resulted in a material increase in value
      1. Court must consider the reliability of management's projections and the respective expert input selections to determine whether debtor met its burden to demonstrate by a preponderance of the evidence that its valuation supports plan predicated on a total enterprise value of less than the total amount of debt
      2. Court agreed with debtor's expert on excluding two companies – just because a company is a competitor that doesn't mean it is a good comparable – who had more facilities and capacity than the debtor
      3. Market versus face value of debt: the record did not support a finding that the debtor's expert's decision to use market value was unreasonable

iv. BIOC/Liquidation Analysis: to confirm the plan, debtor must show by a preponderance of the evidence that as of the effective date, the dissenting class would not be entitled to receive anything in a chapter 7 liquidation
    1. Hypothetical liquidation entails a considerable degree of speculation about a situation that will not occur unless the case is actually converted to a chapter 7 – *In re Larson, Inc.*, 300 B.R. 227, 233 (Bankr. D. Del. 2003)
    2. Court found that there would be no value available to distribute to unsecured creditors in a chapter 7 liquidation
        a. Valuation of litigation – Court accepted discounts for recovery risk
        b. Adequate Protection and other administrative expense claims would be paid before general unsecured claims

H. *In re Tribune Co.*, 972 F.3d 228 (3d Cir. 2020): when determining whether a plan discriminates unfairly, a bankruptcy court should "start by adding up all proposed plan distributions from the debtor's estate and divide by the number of creditors sharing the same priority"
    i. Compare this pro rata baseline to what happens if the plan is implemented
    ii. Cram down plans are an antidote to one or more dissenting classes holding up confirmation of an otherwise consensual plan
    iii. Endorsed the Bankruptcy Court's use of the Markell test in evaluating "unfair discrimination" – a rebuttable presumption of unfair discrimination exists when there is
        1. A dissenting class
        2. Another of the same priority
        3. A difference in the plan's treatment of the two classes that results in
            a. A materially lower percentage recovery for the dissenting class – measured by net present value of all payments or
            b. An allocation of materially greater risk to the dissenting class in connection with its proposed distribution
    iv. The presumption of unfair discrimination under the Markell test can be overcome, if the Court finds that
        1. A lower recovery for the dissenting class is consistent with the results that would occur outside of bankruptcy or
        2. A greater recovery for the other class is offset by contributions from the class to the reorganization

I. *In re Mallinckrodt PLC*, 639 B.R. 837 (Bankr. D. Del. 2022): Judge Dorsey had to consider whether debtor could cram down plan over objection of impaired class under § 1129(b)(1) and whether plan satisfied BIOC under § 1129(a)(7)
    i. Unfair Discrimination: dispute over the total enterprise value between debtors and objectors
        1. Presumption rebutted: increased recoveries to all creditor classes is due to the settlements reached, which in turn, permit the debtors to

continue operating and paying recoveries into the opioid trusts; had debtors' assets been liquidated, recoveries would have been lower
2. No evidence was presented to rebut CRO's testimony and the CRO was credible, the Court found the presumption was rebutted b/c lower recovery for dissenting class was consistent with what would happen outside of bankruptcy
    a. Class 5 claims were against 60 debtors and exceeded $1.5 billion
    b. Class 6(g) claims were against 2 debtors
3. Class 6 and 7 receive recoveries b/c Class 5 allocated its recoveries to fund those distributions – larger gift to trade creditors in Class 7 does not harm Class 6 claimants

ii. Absolute Priority Rule: a dissenting class of unsecured creditors must be provided for in full before any junior class can receive or retain any property; equity holders cannot receive a distribution unless dissenting unsecured creditors receive payment in full or consent to such treatment – *Czyewski v. Jevic Holding Corp.*, 500 U.S. 451 (2017)
1. Objectors argued plan made distributions to equity without paying creditors in full
2. Debtors argued there is no distribution to equity, but Class 5 claimants make a gift directly to Class 6(g)
3. Court looked at debtor's waterfall – Class 5 claimants agreed to redistribute some of their recovery to Class 6 – therefore, the absolute priority rule is not implicated, and the plan does not violate it

iii. BIOC: debtors presented two witnesses – one from restructuring advisor on liquidation valuation of assets including pharmaceutical assets and the other the chief restructuring officer on recoveries in a chapter 7 liquidation
1. Liquidation valuation relied on discounted cash flow and market approaches – asset value would range b/w $2.4 and $2.9 billion
2. In a chapter 7 creditors would receive lower recoveries
3. Court: one objector did not offer any evidence to contradict the debtors' evidence; CRO walked the Court through how the debtor's liquidation analysis was overly generous to creditors in the assumptions it made; a second objector whose claim was being extinguished by 3rd party release offered no evidence on the value of its claim or likelihood of any recovery on account of its claim; a third objector's expert witness was excluded by the Court's ruling on a motion in limine, so the debtor's evidence was uncontroverted

J. *In re Retrotope, Inc.*, 22-10228-JTD [Docket No. 316] (July 12, 2022): in a Subchapter V, Judge Dorsey confirmed plan and approved a 363 sale over the objections of the minority shareholders and losing bidder
    i. Debtor selected the successful bidder after a competitive auction [Docket No. 259]; losing bidder and minority shareholders objected to plan

confirmation/sale approval [Docket Nos. 274, 275] and argued the losing bid was a higher and better offer

1. Stalking Horse Bid/Winning Bid: repayment of DIP obligations plus $19 million in cash
2. Losing Bid: repayment of DIP obligations plus $10.2 million cash now, milestone payments, and future royalty payments –
    a. Developmental milestone: $15 million when regulatory approval in any geography happens
    b. Sales milestone: $30 million – when annual sales reach $2.5 billion
3. Dispute over the valuation model used to value the future royalty payments
    a. SSG valued non-cash portion of losing bid at $7.97 million
    b. Objections argued BIOC was not satisfied, and that winning bid was not the highest and best offer

ii. Court confirmed the plan and approved the sale over the objections; declined to revisit valuation of losing bid and reopen the auction

Assignment

Independently Assess Value of Kodiak Bid

I Apply Economics-based Methods Typical for Biopharmaceutical Industry, and Cited by SSG

Alacrita, "Valuing Pharmaceutical Assets: When to Use NPV vs rNPV," 8/2018.
Avance, NPV vs. rNPV, February 2011, www.avance.ch/newsletter/docs/avance_on_NPV_vs_rNPV.pdf.
DiMasi, Joseph A., and Henry G. Grabowski (2007), "The Cost of Biopharmaceutical R&D: Is Biotech Different?" *Managerial and Decision Economics* 28(4-5): 469-479.

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Summary of Opinions

1. The SSG Valuation of $7.98 M for royalty and milestone payments used improper methods and made questionable, unexplained changes to Kodiak financial model

2. Appropriate methods and corrections yield a substantially higher valuation of $84.59 M for royalty and milestone payments under the Kodiak bid

3. Factors specific to Kodiak and Retrotope provide reasons to believe the corrected valuation is conservative (and suggest valuations as high or greater than $241.54 M for royalty and milestone payments)

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Materials Considered

- ✓ SSG Valuation
- ✓ Kodiak Bid Documents
- ✓ Marketplace research
- ✓ White Papers
- ✓ Interviews

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Assumptions for Assessment

- Kodiak undertook reasonable analysis of market opportunity based on its experience and capabilities in retinal disease
  - Market size and penetration
  - Unmet patient need
  - Pricing and reimbursement
  - Time to market and peak sales
- Kodiak has economic self interest in maximizing the value of the Retrotope Assets (RT001 and RT011)
  - Would make rational investment choices based on its capabilities

Kodiak, "Kodiak Bid Structure Document," 6/26/2022, at 4-5.

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Kodiak Sciences sales forecast

Kodiak, "Kodiak Bid Structure Document," 6/26/2022, at 3.

Framework of Evaluation

- Review SSG valuation
- Identify and correct errors and improper adjustments
- Conduct baseline valuation using proper methods and adjustments
- Consider impact of factors that suggest the corrected valuation is conservative

Summary of Assessment

	Adjustments	Cash Offer	Discounted Future Consideration
SSG Capital base model		**$18.2 M**	**$7.98 M**
Baseline Assessment Correct errors and use Kodiak revenue assumptions	• 25% discount rate to 13.85% WACC • Change single 7.9% POS to 11.9% and 5.9% applied to each independent development opportunity • 100% projected intermediate AMD revenues • Kodiak Sciences projected product approval date	**$18.2 M**	**$84.59 M**
Factors that suggest Baseline Assessment is conservative	(*all below assessments include adjustments made in Baseline Assessment*)		
Earlier product launches due to breakthrough nature of treatment, high unmet need	• Intermediate AMD: 2030 first revenues → 2028 • Neurology: 2032 first revenues → 2030	**$18.2 M**	**$108.04 M**
Higher sales revenues based on potential for price increases over flat pricing, additional market opportunities in rare neuro indications	• 3% revenue growth rate above Kodiak projections	**$18.2 M**	**$97.60 M**
Biomarker adjustment based on higher historical approval rates for such	• 11.9% × 2.09 = 24.9% probability, Ophthalmology	**$18.2 M**	**$163.85 M**

FRED Economic Data, "20-Year Expected Inflation," 6/13/2022, available at: https://fred.stlouisfed.org/series/EXPINF20YR.
Alacrita, Due Diligence of Retrotope, April 2020.
IQVIA Institute for Human Data Science, "Lessons Learned from COVID-19 Vaccine Trials," 4/28/2022, available at: https://www.iqvia.com/insights/the-iqvia-institute/reports/lesson-learned-from-covid-19-vaccine-trials.
BIO, "Clinical Development Success Rates and Contributing Factors 2011-2020," 2/2021, available at: https://www.bio.org/clinical-development-success-rates-and-contributing-factors-2011-2020.
Conversation with Victor Perlroth, Kodiak Sciences CEO and Chairman, 7/1/2022.
Conversations with Robert Molinari, Harry Saal, and Charles Cantor, former Retrotope officers and directors and existing shareholders, 6/29/2022.

SSG Valuation Model

Overview of SSG Valuation

- Started with Kodiak revenue projections from 2028 to 2040 for treatments for two ophthalmology and one neuro condition with milestone payments and royalty payments as specified by Kodiak
- Selected arbitrarily high 25% annual discount rate for milestone and royalty payments
- Incorrectly applied a 7.9% probability of success (POS) to all milestone and royalty payments (in addition to arbitrarily high 25% annual discount rate)
  - Proper methodology dictates setting discount rates equal to the investing company's WACC and using product specific POS accounting for each independent development opportunity
- Without explanation, decreased Kodiak revenue projections for one ophthalmology treatment by 50% in every year
- Without explanation, delayed product launch of all products by three years
- Calculated value of milestone and royalty payments: $7.98 M
- Undiscounted value of milestone and royalty payments: $3.85 B

Retrotope, Retrotope - Kodiak_Bid_Analysis_from_Debtor.xlsx, at tab "KODIAK Value Analysis."

11

Factors Underlying Present Value Analysis for Medical Products

Time-Value of Money

A sum of money is worth more now than the same amount is worth in the future.

Market Uncertainty

Future incomes are uncertain and include fluctuations based both on market effects and company characteristics rather than being constant.

Company's WACC based on CAPM

Regulatory Approval Risk

Medical products may not receive required regulatory approval to enter the market. This is risk somewhat unique to this sector.

Additional Measurable Risk

Alacrita, "Valuing Pharmaceutical Assets: When to Use NPV vs rNPV," 8/2018, at 1.

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Ways to Address Additional Regulatory Risk

NPV Approach: Higher Discount Rate

Uses higher discount rate (above WACC) to account for additional project risk

Investors naturally require a higher rate of return for riskier investments because of the increased likelihood that their returns will never materialize. The discount rate used, therefore, needs to correspond to the expected rate of return and the perceived risk of the investment.

Table 2: NPV Discount Rates Based on Project Stage

Stage of Project	Discount Rate (average)
Early	40.1%
Mid	26.7%
Late	19.5%

Source: Avance Biodrat Discount Survey

rNPV Approach: Risk Adjustment Factor

Uses lower discount rate (like WACC) and adds additional risk adjustment factor to calculation

rNPV
Determining the risk-adjusted net present value (rNPV), like NPV, also involves forecasting the revenues (cash inflows), costs (cash outflows) and their respective timing but additionally requires the relevant success rate(s) for each stage of development.

success at each stage.[8] To account for risk, the expected net cash flow for a given time period is multiplied by the probability of it occurring. If an

Table 3: Sample of rNPV Discount Rates

Company	Discount Rate for TPRAD Assets (average)	Source
Pfizer	13.5%	Financial Report 2015
AstraZeneca	13.0%	Annual Report 2016
Johnson and Johnson	12.2%	Annual Report 2016
Allergan	11.3%	Annual Report 2017
Roche	10.0%	Financial Report 2017

Both approaches can yield similar results if additional risk accounted for properly

Alacrita, "Valuing Pharmaceutical Assets: When to Use NPV vs rNPV," 8/2018, at 3, 5.

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Unexplained Implementation: Halving Intermediate AMD Revenue

- SSG Model reduces Intermediate AMD Revenue by 50%
- SSG Model provides no indication as to why Intermediate AMD Revenue is reduced by half in each year

Assumptions		
Upfront Cash Consideration	$	18.20
Royalty Rates		
Annual Net Sales Below $500M		4.5%
Annual Net Sales Between $500M - $1,000M		3.5%
Annual Net Sales Above $1,000M		2.5%
Discount Rates		
Discount Rate - Royalty Payments[1]		25.0%
Discount Rate - Milestone Payments[1]		25.0%
Intermediate AMD Revenue Discount		50.0%
RT011 Commercialization Year		January 31, 2030
Royalty Payments Terminated 13 Years After Commercialization		
Sales and Development Milestones		
Milestone		**Payment**
Approval in any geography	$	15.00
Annual net sales first reach $1000M	$	30.00
Annual net sales first reach $2500M	$	40.00
Milestone Assumptions		
Milestone		**Prob. Of Success**
Approval		7.9%

Retrotope, Retrotope - Kodiak_Bid_Analysis_from_Debtor.xlsx, at tab "KODIAK Value Analysis."

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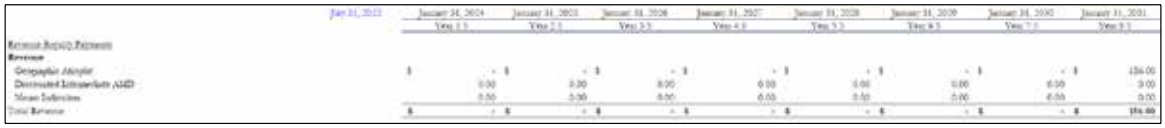
Unexplained Implementation: Sales Launch Year



RT011 Commercialization Year	January 31, 2030
Royalty Payments Terminated 13 Years After Commercialization	

SSG model estimated the first approval to occur in 2030, with revenues beginning in 2031, each 3 years later than Kodiak's assumption

Retrotope, Retrotope - Kodiak_Bid_Analysis_from_Debtor.xlsx, at tab "KODIAK Value Analysis."
Wong, Chi Heem, Kien Wei Siah, and Andrew W. Lo (2019), "Estimation of Clinical Trial Success Rates and Related Parameters," *Biostatistics* 20(2): 273-286.
DiMasi, Joseph A., and Henry G. Grabowski (2007), "The Cost of Biopharmaceutical R&D: Is Biotech Different?" *Managerial and Decision Economics* 28(4-5): 469-479.

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SSG Used Incorrect Approach in Adjusting for Probability of Success

- Retrotope has 2 product candidates in testing
  - RT-001 (for neurology indications)
  - RT-011 (for ophthalmology indications)
- SSG Model applies a single "Probability of Success"
  - Either both approved or neither approved
  - Important to account for independent investment opportunities
- Data source shows different approval percentages for different medical fields

Retrotope, Retrotope - Kodiak_Bid_Analysis_from_Debtor.xlsx, at tab "KODIAK Value Analysis."
Kodiak, "Kodiak Bid Structure Document," 6/26/2022, at 7.

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Appropriate POS analysis evaluates 8 potential outcomes

X = Success in Given Indication

	Geographic Atrophy (11.9%)	Intermediate AMD (11.9%)	Neurology (5.9%)	Probability Calculation	Probability of Outcome
Outcome 1				(100% − 11.9%) × (100% − 11.9%) × (100% − 5.9%)	73.04%
Outcome 2	X			11.9% × (100% − 11.9%) × (100% − 5.9%)	9.87%
Outcome 3		X		(100% − 11.9%) × 11.9% × (100% − 5.9%)	9.87%
Outcome 4	X	X		11.9% × 11.9% × (100% − 5.9%)	1.33%
Outcome 5			X	(100% − 11.9%) × (100% − 11.9%) × 5.9%	4.58%
Outcome 6	X		X	11.9% × (100% − 11.9%) × 5.9%	0.62%
Outcome 7		X	X	(100% − 11.9%) × 11.9% × 5.9%	0.62%
Outcome 8	X	X	X	11.9% × 11.9% × 5.9%	0.08%

Larsen, Richard J. and Morris L. Marx (1986), *An Introduction to Mathematical Statistics and Its Applications*, 2nd ed., Englewood Cliffs, New Jersey: Prentice-Hall, Inc.., at 68-69.

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Corrected Baseline Valuation

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Cumulative impact of corrections and adjustments to SSG valuation

	Probability of Outcome	Discounted Future Consideration	Probability Weighted Discounted Future Consideration
Outcome 1: No Approvals	73.04%	$0	$0
Outcome 2: Geographic Atrophy	9.87%	$288.53 M	$28.46 M
Outcome 3: Intermediate AMD	9.87%	$346.75 M	$34.21 M
Outcome 4: Geographic Atrophy and Intermediate AMD	1.33%	$575.13 M	$7.66 M
Outcome 5: Neurology	4.58%	$174.93 M	$8.01 M
Outcome 6: Geographic Atrophy and Neurology	0.62%	$427.44 M	$2.64 M
Outcome 7: Intermediate AMD and Neurology	0.62%	$485.66 M	$3.00 M
Outcome 8: All Indications / Fields	0.08%	$714.04 M	$0.60 M
Valuation of Discounted Future Consideration	**100.00%**		**$84.59 M**
Valuation of Total Offer (Cash Offer + Discounted Future Consideration)			**$102.79 M**

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Sensitivity Analyses

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Is the baseline valuation conservative?

- Additional factors, including those specific to Retrotope product candidates, make the Retrotope product candidates more likely to obtain approval and achieve market success than average candidates
  - Lessons learned from COVID-19 response may help accelerate development and approval
  - Oral therapies compared to intravitreal injection for retinal diseases would be substantial breakthrough
  - Limited competition in targeted indications suggest revenues may be higher than assumed
  - Sales revenue forecasts based on conservative sales shares, and pricing over time
  - Strong safety profile and further progression for certain indications
  - Approval more likely for conditions with biomarkers, and those for rare conditions

Alacrita, Due Diligence of Retrotope, April 2020.
IQVIA Institute for Human Data Science, "Lessons Learned from COVID-19 Vaccine Trials," 4/28/2022, available at: https://www.iqvia.com/insights/the-iqvia-institute/reports/lesson-learned-from-covid-19-vaccine-trials.
BIO, "Clinical Development Success Rates and Contributing Factors 2011-2020," 2/2021, available at: https://www.bio.org/clinical-development-success-rates-and-contributing-factors-2011-2020.
Wong, Chi Heem, Kien Wei Siah, and Andrew W. Lo (2019), "Estimation of Clinical Trial Success Rates and Related Parameters," *Biostatistics* 20(2): 273-286.
Conversation with Victor Perlroth, Kodiak Sciences CEO and Chairman, 7/1/2022.
Conversations with Robert Molinari, Harry Saal, and Charles Cantor, former Retrotope officers and directors and existing shareholders, 6/29/2022.

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Conclusion: Baseline valuation is much higher than SSG indicates, with large potential upside

Assessment and Factors	Cash Offer	Discounted Future Consideration	Total Value
SSG Capital base model	**$18.2 M**	**$7.98 M**	**$26.18 M**
Baseline Assessment • *Correct errors and use Kodiak assumptions*	**$18.2 M**	**$84.59 M**	**$102.79 M**
Factors that suggest Baseline Assessment is conservative	(*Incremental impact of each factor calculated in isolation*)		
Earlier Intermediate AMD and Neurological product launches due to breakthrough nature of treatment, high unmet need, lessons learned from COVID-19	**$18.2 M**	**$108.04 M**	**$126.24 M**
Higher sales revenue (3% annual growth factor applied to Kodiak projections) due to potential for price increases v. flat pricing assumption, limited potential competition, and additional market opportunities in rare neuro indications • *Note: Federal Reserve model forecasts 2.4 average annual inflation over next 20 years*	**$18.2 M**	**$97.60 M**	**$115.80 M**
Biomarker adjustments to POS based on higher historical approval rates • *Note similar adjustments could be made (but were not) for rare disease indications, and for clinical trial progress on orphan neuro indications, and for the absence of toxicity signals. Such adjustments would increase valuation.*	**$18.2 M**	**$163.85 M**	**$182.05 M**
Cumulative impact of factors suggesting Baseline Assessment is conservative	**$18.2 M**	**$241.54 M**	**$259.74 M**

FRED Economic Data, "20-Year Expected Inflation," 6/13/2022, available at: https://fred.stlouisfed.org/series/EXPINF20YR.
Alacrita, Due Diligence of Retrotope, April 2020.
IQVIA Institute for Human Data Science, "Lessons Learned from COVID-19 Vaccine Trials," 4/28/2022, available at: https://www.iqvia.com/insights/the-iqvia-institute/reports/lesson-learned-from-covid-19-vaccine-trials.
BIO, "Clinical Development Success Rates and Contributing Factors 2011-2020," 2/2021, available at: https://www.bio.org/clinical-development-success-rates-and-contributing-factors-2011-2020.
Conversation with Victor Perlroth, Kodiak Sciences CEO and Chairman, 7/1/2022.
Conversations with Robert Molinari, Harry Saal, and Charles Cantor, former Retrotope officers and directors and existing shareholders, 6/29/2022.

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RETROTOPE

Offer Analysis

SSG CAPITAL ADVISORS, LLC

Offer Analysis – Initial Review of Kodiak's Hypothetical Proposal

Overview

- On June 26th, Kodiak presented a hypothetical scenario whereby it would submit additional bids for the assets of Retrotope utilizing a milestone payment and revenue-based royalty structure tied to the approval and commercialization of drugs from both the RT-001 and RT-011 drug platforms
  - This presentation included assumptions for the time in years to commercialization, the percentages of future revenues and performance-based milestone payments to the stakeholders of Retrotope, while accounting for risk through the application of a 10% discount rate
- SSG has reviewed Kodiak's analysis and prepared additional analyses to further sensitize these hypothetical revenue streams to account for the significant risk associated with a pre-clinical drug-platform such as RT-011, which is the primary interest of Kodiak
- Our approach to valuing a hypothetical Kodiak bid includes utilizing probability of success (POS), discount rate and time to drug approval/commercialization:
  - Probability of success: a factor applied to take into consideration the likelihood of drug approval
    - Assumed POS of 7.9%, which is consistent with the success rates of all drugs that reach Phase I [(1)]
  - Discount rate: a rate utilized to discount future cash flow streams to present value
    - Assumed discount rate of 25% to account for the elevated risk profile of Retrotope's drug candidates, combined with unknown factors potentially facing Kodiak, such as access to future capital
  - Time to commercialization: point at which the milestone payments for regulatory approval would be due and the revenue-based royalties begin accruing
    - Kodiak assumes its first Retrotope based drug approval in year 5, with commercialization beginning the year after
    - Given the often unpredictable timelines for approval and commercialization of new drug candidates, SSG also analyzed drug approvals beginning in years 7.5 and 10

(1) Informa Pharma Intelligence, Clinical Development Success Rates and Contributing Factors 2011-2020

Offer Analysis – Initial Review of Kodiak's Hypothetical Proposal

Assumptions

The valuation analysis of the hypothetical offer received from Kodiak assumes the following

- 25% royalty discount rate
- 25% milestone discount rate
- 7.9% weighted probability of success for all future payments / revenue streams / milestones
  - All assumptions are based on SSG and Kodiak supplied industry research

Assumptions		*($ in MMs)*
Upfront Cash Consideration	$	20.20
Royalty Rates		
Annual Net Sales Below $500M		4.5%
Annual Net Sales Between $500M - $1,000M		3.5%
Annual Net Sales Above $1,000M		2.5%
Discount Rate - Royalty Payments[1]		25.0%
Discount Rate - Milestone Payments[1]		25.0%
Royalty Payments Terminated 13 Years After Commercialization		

Sales and Development Milestones

Event		**Payment**
Approval in any geography	$	15.00
Annual net sales first reach $1000M	$	30.00
Annual net sales first reach $2500M	$	40.00

Milestone Assumptions

Milestone	**Prob. Of Success**
Approval	7.9%

(1) *https://www.alacrita.com/whitepapers/valuing-pharmaceutical-assets-when-to-use-npv-vs-rnpv; Avance Biostrat Discount Survey*

Offer Analysis – Initial Review of Kodiak's Hypothetical Proposal

Offer Value - 5 / 7.5 / 10 Years to Commercialization

Assumes 5 Years to Commercialization

Royalties		*($ in MMs)*
Total Present Value of Royalty Payments	$	14.06
Development and Sales Milestones		
Total Present Value of Milestones		1.21
Cash Offer		
Total Cash Offer		20.20
Total Value	**$**	**35.47**

Assumes 7.5 Years to Commercialization

Royalties		*($ in MMs)*
Total Present Value of Royalty Payments	$	8.05
Development and Sales Milestones		
Total Present Value of Milestones		0.69
Cash Offer		
Total Cash Offer		20.20
Total Value	**$**	**28.94**

Assumes 10 Years to Commercialization

Royalties		*($ in MMs)*
Total Present Value of Royalty Payments	$	5.76
Development and Sales Milestones		
Total Present Value of Milestones		0.50
Cash Offer		
Total Cash Offer		20.20
Total Value	**$**	**26.45**

Note: detailed analysis and support can be found in the accompanying excel file

Offer Analysis – Revised Approach Utilized After Consultation with Retrotope Management

Overview

- Subsequent to SSG preparing its initial valuation of the Kodiak offer on the previous pages, SSG met with the Board and management of Retrotope to discuss the hypothetical offer
- The Retrotope management team suggested revisions to the analysis, based on the expectation of success in Intermediate AMD
  - Intermediate AMD is a state of progression in AMD where there are currently no approved therapies
  - Given the intermediate nature of this indication, the FDA has not currently provided guidance on the approvability, or required endpoints, of a drug candidate to combat the progression of AMD
- While the market for Intermediate AMD is potentially large, it was deemed necessary to adjust for the ultimate revenue potential for this indication given the expected likelihood for approval
  - Current Retrotope management was not pursuing development for this indication given perceived success of FDA approval
- SSG applied a 50% discount to the future revenue potential of Intermediate AMD in its valuation model used to compare offers at auction

Offer Analysis – Revised Approach Utilized After Consultation with Retrotope Management

Assumptions

The valuation analysis at the time of auction assumes the following

- $18.2mm cash consideration, based on amount of DIP drawn at time of auction
- 25% royalty discount rate
- 25% milestone discount rate
- 50% discount to revenue potential for Intermediate AMD
- 7.9% weighted probability of success for all future payments / revenue streams / milestones
  - All assumptions are based on SSG and Kodiak supplied industry research

Assumptions	($ in MMs)
Upfront Cash Consideration	$ 18.20
Royalty Rates	
Annual Net Sales Below $500m	4.5%
Annual Net Sales Between $500m - $1,000m	3.5%
Annual Net Sales Above $1,000m	2.5%
Discount Rates	
Discount Rate - Royalty Payments[1]	25.0%
Discount Rate - Milestone Payments[1]	25.0%
Intermediate AMD Revenue Discount	50.0%
Royalty Payments Terminated 13 Years After Commercialization	

Sales and Development Milestones

Milestone Payments	Payment
Approval in any geography	$ 15.00
Annual net sales first reach $1,000m	$ 30.00
Annual net sales first reach $2,500m	$ 40.00

Milestone Assumptions

Milestone	Prob. Of Success
Approval	7.9%

Note: blue box indicates revisions to SSG valuation model after consultation with management

(1) https://www.alacrita.com/whitepapers/valuing-pharmaceutical-assets-when-to-use-npv-vs-rnpv; Avance Biostrat Discount Survey

Offer Analysis – Revised Approach Utilized After Consultation with Retrotope Management

Offer Value - 5 / 7.5 / 10 Years to Commercialization

Assumes 5 Years to Commercialization

Royalties	*($ in MMs)*
Total Present Value of Royalty Payments	$ 12.00
Development and Sales Milestones	
Total Present Value of Milestones	$ 1.21
Cash Offer	
Total Cash Offer	$ 18.20
Total Value	**$ 31.41**

Assumes 7.5 Years to Commercialization

Royalties	*($ in MMs)*
Total Present Value of Royalty Payments	$ 6.87
Development and Sales Milestones	
Total Present Value of Milestones	$ 0.69
Cash Offer	
Total Cash Offer	$ 18.20
Total Value	**$ 25.76**

Assumes 10 Years to Commercialization

Royalties	*($ in MMs)*
Total Present Value of Royalty Payments	$ 3.93
Development and Sales Milestones	
Total Present Value of Milestones	$ 0.40
Cash Offer	
Total Cash Offer	$ 18.20
Total Value	**$ 22.53**

Note: detailed analysis and support can be found in the accompanying excel file

Offer Analysis – Revised Approach Utilized After Consultation with Retrotope Management

Overview

- A sample of SSG's valuation model is provided below, detailing the proceeds potential for Kodiak's offer utilizing SSG's assumptions
  - This model assumes that commercialization for Geographic Atrophy, Retrotope's lead drug candidate, occurs 7.5 years from the sale of Retrotope's assets in the Chapter 11 proceedings

($ in MMs)	January 31, 2024 Year 1.5	January 31, 2025 Year 2.5	January 31, 2026 Year 3.5	January 31, 2027 Year 4.5	January 31, 2028 Year 5.5	January 31, 2029 Year 6.5	January 31, 2030 Year 7.5	January 31, 2031 Year 8.5	January 31, 2032 Year 9.5	January 31, 2033 Year 10.5	January 31, 2034 Year 11.5	January 31, 2035 Year 12.5	January 31, 2036 Year 13.5	January 31, 2037 Year 14.5	January 31, 2038 Year 15.5	January 31, 2039 Year 16.5	January 31, 2040 Year 17.5	January 31, 2041 Year 18.5	January 31, 2042 Year 19.5	January 31, 2043 Year 20.5
Revenue Royalty Payments																				
Kodiak Proposed Revenues																				
Geographic Atrophy	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 156.00	$ 571.00	$ 1,423.00	$ 2,528.00	$ 3,446.00	$ 3,951.00	$ 4,195.00	$ 4,271.00	$ 4,348.00	$ 4,426.00	$ 4,506.00	$ 4,587.00	$ 4,669.00
Intermediate AMD (50% Discount)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	153.00	563.00	1,402.50	2,492.50	3,397.00	3,895.00	4,135.50	4,210.00	4,286.00	4,363.00	4,441.50
Neuro Indication	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	252.00	951.00	2,122.00	2,771.00	3,140.00	3,405.00	4,256.00	4,570.00	4,485.00
Total Revenue	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 156.00	$ 571.00	$ 1,576.00	$ 3,091.00	$ 5,080.50	$ 7,294.50	$ 9,714.00	$ 10,937.00	$ 13,623.50	$ 14,529.00	$ 15,050.00	$ 15,520.00	$ 15,595.50
Royalty Revenue by Tier																				
$0-500m								156.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00
$500m-1,000m								0.00	71.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00	500.00
>$1,000m								0.00	0.00	576.00	2,091.00	4,080.50	6,294.50	8,714.00	10,937.00	12,623.50	13,529.00	14,050.00	14,520.00	14,595.50
Total Revenue								156.00	571.00	1,576.00	3,091.00	5,080.50	7,294.50	9,714.00	11,937.00	13,623.50	14,529.00	15,050.00	15,520.00	15,595.50
Royalty Revenue Payments (Undiscounted)																				
$0-500m							$	7.02	$ 22.50	$ 22.50	$ 22.50	$ 22.50	$ 22.50	$ 22.50	$ 22.50	$ 22.50	$ 22.50	$ 22.50	$ 22.50	$ 22.50
$500m-$1,000m								0.00	2.49	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50
>$1,000m								0.00	0.00	14.40	52.28	102.01	157.36	217.85	273.43	313.59	338.23	351.25	358.00	364.89
Total Royalty Payments	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 7.02	$ 24.99	$ 54.40	$ 92.28	$ 142.01	$ 197.36	$ 257.85	$ 313.43	$ 353.59	$ 378.23	$ 391.25	$ 398.00	$ 404.89
Probability of Success	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%
Weighted Royalty Payments	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.55	1.97	4.30	7.29	11.22	15.59	20.37	24.76	28.09	29.98	30.91	31.44	31.99
Discount Period (year)	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5
Discount Factor	0.7155	0.5724	0.4579	0.3664	0.2931	0.2345	0.1876	0.1501	0.1200	0.0960	0.0768	0.0615	0.0492	0.0393	0.0315	0.0252	0.0201	0.0161	0.0129	0.0103
Present Value of Royalty Payments	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.08	$ 0.24	$ 0.41	$ 0.56	$ 0.69	$ 0.77	$ 0.80	$ 0.78	$ 0.71	$ 0.60	$ 0.50	$ 0.41	$ 0.33
Cumulative Present Value of Royalty Payments	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.08	$ 0.32	$ 0.73	$ 1.29	$ 1.98	$ 2.75	$ 3.55	$ 4.33	$ 5.04	$ 5.64	$ 6.14	$ 6.54	$ 6.87
Milestone Payments																				
Development and Sales Milestone Payments	$ -	$ -	$ -	$ -	$ -	$ -	$ -	15.00	-	-	$ -	30.00	40.00	-	-	-	-	-	-	-
Probability of Success	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%
Weighted Development and Sales Milestone Payments	0.00	0.00	0.00	0.00	0.00	0.00	1.19	0.00	0.00	2.37	3.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Discount Period (year)	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5
Discount Factor	0.7155	0.5724	0.4579	0.3664	0.2931	0.2345	0.1876	0.1501	0.1200	0.0960	0.0768	0.0615	0.0492	0.0393	0.0315	0.0252	0.0201	0.0161	0.0129	0.0103
Present Value of Licensing / Milestone Payments	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.22	$ -	$ -	$ 0.23	$ 0.24	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Cumulative Present Value of Development and Sales Milestone Payments	$ -	$ -	$ -	$ -	$ -	$ -	$ 0.22	$ 0.22	$ 0.22	$ 0.45	$ 0.69	$ 0.69	$ 0.69	$ 0.69	$ 0.69	$ 0.69	$ 0.69	$ 0.69	$ 0.69	$ 0.69

Valuation Methodologies: A Judge's View*

©Hon. Christopher S. Sontchi

United States Bankruptcy Judge for the District of Delaware

At heart, chapter 11 is a simple exercise. In bankruptcy parlance, it is to gather the property of the estate, determine the amount and nature of the claims and confirm a plan of reorganization that distributes the property of the estate to the creditors in accordance with the requirements of the Bankruptcy Code.[1] Inherent in this process is determining the *value* of the property of the estate and the claims. Understanding the methodologies used to determine value is critical for any attorney or judge in this field.[2] The goal of this article is to provide the reader with a basic understanding of the methodologies used to value an asset.

What is the value of an asset or a firm? The standard definition is that the value of an asset is its material or monetary worth, i.e., "the amount of money, goods, etc., for which a thing can be exchanged or traded."[3] Of course, the easiest and most accurate way to determine the amount of money for which an asset can be exchanged is to do just that-exchange the asset for money or, put more plainly, sell it. When one does not wish to sell the asset or simply cannot do so it becomes more difficult to determine the asset's value. Nonetheless, in determining an asset's

* The author has relied on a number of sources for the information in this chapter. The primary resource has been Professor Damodaran's excellent treatise on valuation. ASWATH DAMODARAN, INVESTMENT VALUATION: TOOLS AND TECHNIQUES FOR DETERMINING THE VALUE OF ANY ASSET (2d ed. 2002).

[1] Of course, like most things in life, the devil is in the details!

[2] Valuation issues arise in a number of contexts under the Code. *See, e.g.*, 11 U.S.C. § 361 (2006) (whether adequate protection must be provided and, if so, what type); 11 U.S.C. § 362(d)(1), (2)(a) (whether the automatic stay should be lifted for cause, including lack of adequate protection, or because the debtor lacks equity in the property, respectively); 11 U.S.C. § 506 (determination of secured status); 11 U.S.C. § 1129(a)(7)(A)(ii) (whether the plan satisfies the best interest of creditors test); 11 U.S.C. § 1129(b) (whether the plan satisfies the fair and equitable test).

[3] THE NEW II THE SHORTER OXFORD ENGLISH DICTIONARY 3495 (6th ed. 2007).; *see also* BLACK'S LAW DICTIONARY 1690 (9th ed. 2009) ("The monetary worth or price of something; the amount of goods services or money that something commands in an exchange.").

value the ultimate goal remains the same-to determine as accurately as possible what the sale price would be.[4]

The most obvious method for estimating an asset's potential sale price is to consult the current market price for that asset. Of course, not all assets can be readily bought and sold in a market. For example, while there is a ready market for trading in bushels of wheat there is no such market for wheat farms (if for no other reason that each farm is unique) such that one could consult a market price to determine the farm's value. Even when there is a market it may not fairly estimate the potential sale price of an asset if the market is inefficient, disrupted or dysfunctional.

Financial academics and professionals have established a variety of methodologies to determine the value of assets that are not readily valued by reference to a market. Broadly speaking, a firm, its assets and/or its equity can be valued in one of four ways: (i) asset-based valuation where one estimates the value of a firm by determining the current value of its assets, (ii) discounted cash flow or "DCF" valuation where one discounts cash flows to arrive at a value of the firm or its equity, (iii) relative valuation approaches, which include the "comparable company analysis" and the "comparable transaction analysis" that base value on how comparable assets are priced, and (iv) option pricing that uses contingent claim valuation.

Other than option pricing, all of these valuation methodologies, either individually or in various combinations, are routinely presented to bankruptcy courts in valuation hearings.[5] No matter

[4] The same principle holds for determining a firm's value as a corporation is nothing more than a collection of contracts operating as a fictitious entity. These contracts, in turn, are a pool of assets and liabilities. The disposition of these assets and liabilities through the corporate entity is controlled by the entity's shareholders, board of directors, management, and/or creditors. *See, e.g.*, FRANK H. EASTERBROOK & DANIEL R. FISCHEL, THE ECONOMIC STRUCTURE OF CORPORATE LAW 15–22, 35 (Harvard University Press,1st ed. 1991) (describing effect corporate contracts have on firm's valuation).

[5] Indeed, numerous courts have been presented with and considered these methodologies. *See* Credit Agricole Corporate & Inv. Bank N.Y. Branch v. Am. Home Mortg. Holdings, Inc. (*In re* Am. Home Mortg. Holdings, Inc.), 637 F.3d 246, 258 (3d Cir. 2011) (affirming bankruptcy court's use of discounted cash flow analysis as a reasonable

which methodology is used, however, the purpose remains the same-to determine as accurately as possible what the sale price would be, which is referred to as "price discovery."

1. Asset-Based Valuation

An asset-based valuation is where one calculates the value of individual assets owned by a firm and aggregates them to arrive at a firm value. There are two primary asset-based valuation models. The first is liquidation value, which is obtained by aggregating the estimated sale

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determinant of value); Bank of N.Y Trust Co. v. Pacific Lumbar Co. (*In re* SCOPAC), 624 F.3d 274, 286 (5th Cir. 2010) (affirming bankruptcy court's use of discounted cash flow to determine if collateral declined in value); ASARCO LLC v. Ams. Mining Corp., 396 B.R. 278, 342–63 (S.D. Tex. 2008) (finding discounted cash flow most reliable and comparable companies appproach least reliable for this debtor); Peltz v. Hatten, 279 B.R. 710, 728–34 (D. Del. 2002) (describing experts' valuation methods and calculation of variables in fraudulent conveyance action); *In re* PTL Holdings LLC, No. 11-12676 (BLS), 2011 WL 5509031, at *6–11 (Bankr. D. Del. Nov. 10, 2011) (describing and analyzing valuation of debtor using discounted cash flow, comparable companies and comparable transactions methodologies); *In re* Tribune Co., No. 08-13141 (KJC), 2011 WL 5142420, at *8–12 (Bankr. D. Del. Oct. 31, 2011) (analyzing experts' valuation of debtor using discounted cash flow, comparable companies methodologies); *In re* Chemtura Corp., 439 B.R. 561, 572–90 (Bankr. S.D.N.Y. 2010) (discussing and evaluting discounted cash flow, comparable companies, and precedent transaction valuation methodologies); *In re* DBSD North Am., Inc., 419 B.R. 179, 195–99 (Bankr. S.D.N.Y. 2009), *rev'd on other grounds*, 634 F.3d 79 (2d Cir. 2011) (scrutinizing inaccuracies in experts' discounted cash flow and trading comparables valuations); *In re* Iridium Operating LLC, 373 B.R. 283, 346–52 (Bankr. S.D.N.Y. 2007) (describing and analyzing solvency and adequacy of capitalization using market analysis while rejecting expert's application of discounted cash flow analysis); *In re* Am. Classic Voyages Co., 367 B.R. 500, 509–14 (Bankr. D. Del. 2007) (evaluating debtor's solvency in preference action using discounted cash flow method); *In re* Nellson Nutraceutical, Inc., No. 06-10072 (CSS), 2007 WL 201134, at *22–42 (Bankr. D. Del. Jan. 18, 2007) (inspecting experts' application of discounted cash flow, comparable companies and comparable transactions methodologies); *In re* Nellson Nutraceutical, Inc., 356 B.R. 364, 370–76 (Bankr. D. Del. 2006) (excluding expert's discounted cash flow valuation evidence); *In re* Oneida Ltd., 351 B.R. 79, 87-92 (Bankr. S.D.N.Y. 2006) (detailing investment bankers' valuation methods under discounted cash flow, comparable companies and comparable transactions methodologies to determine plan was fair and equitable); *In re* Med Diversified, Inc., 346 B.R. 621, 630–42 (Bankr. E.D.N.Y. 2006) (holding expert's valuation of debtor inaccurate and inadmissible for using unreliable variables); *In re* Mirant Corp., 334 B.R. 800, 815–20 (Bankr. N.D. Tex. 2005) (assessing debtor's value using discounted cash flow and comparable companies methodologies); *In re* Heilig-Meyers Co., 319 B.R. 447, 458–63 (Bankr. E.D. Va. 2004) (analyzing debtor's solvency in preference action using comparable companies methodology); *In re* Coram Healthcare Corp., 315 B.R. 321, 337–47 (Bankr. D. Del. 2004) (evaluating debtor's going concern value to determine whether proposed plan was fair and equitable using comparable public company analysis, comparable transactions analysis, and discounted cash flow method); *In re* Bush Indus., Inc., 315 B.R. 292, 299–303 (Bankr. W.D.N.Y. 2004) (describing and applying three valuation methods to calculate debtor's enterprise value); *In re* Exide Techs., 303 B.R. 48, 58–66 (Bankr. D. Del. 2003) (discussing discounted cash flow, comparable companies, and comparable transactions); *In re* Payless Cashways, Inc., 290 B.R. 689, 698–702 (Bankr. W.D. Mo. 2003) (analyzing debtor's solvency in preference action using comparable companies analysis); *In re* Joy Recovery Tech. Corp., 286 B.R. 54, 77–79 (Bankr. N.D. Ill. 2002) (using comparable companies methodology in fraudulent conveyance action); *In re* Lids Corp., 281 B.R. 535, 541–45 (Bankr. D. Del. 2002) (applying the three valuation methods in preference action); *In re* Zenith Elecs. Corp., 241 B.R. 92, 103–05 (Bankr. D. Del. 1999) (relying discounted cash flow method to determine whether proposed plan was fair and equitable).

proceeds of the assets owned by firm. The second is replacement cost, where one estimates what it would cost to replace all of the assets that a firm owns today.

Asset-based valuations are different from DCF valuations and of much more limited utility. In liquidation valuation, for example, one looks only at the assets in place and estimates their value based on how similar assets are currently priced in the market. In a DCF valuation, which is discussed more fully below, one considers all the firm's assets *and their expected growth potential* to arrive at value.[6] Only in the instance where (i) a firm does not have any growth assets and (ii) the market accurately reflects expected cash flows in its pricing of the firm's assets will an asset-based valuation result in a similar conclusion as a DCF valuation.

Nonetheless, asset-based valuations are commonly used in chapter 11. For example, under section 1129(a)(7)(A) of the Bankruptcy Code, in order for a debtor to confirm a plan of reorganization it must establish that *each holder* of a claim or interest in an impaired class has either voted for the plan or

> will receive or retain under the plan on account of such claim or interest in property of the value, as of the effective date of the plan, that is not less than the amount that such holder would so receive or retain if the debtor were liquidated under chapter 7 of this title on such date.[7]

As a case under chapter 7 of the Bankruptcy Code involves the liquidation of the debtor's assets, a debtor seeking to satisfy section 1129(a)(7)(A) will often present expert testimony as to the liquidation value of the debtor's assets.[8]

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[6] *See* Stan Bernstein, Susan H. Seabury & Jack F. Williams, *Squaring Bankruptcy Valuation Practice with* Daubert *Demands*, 16 AM. BANKR. INST. L. REV. 161, 173 (2008) (describing income approach analysis as dependent upon debtor's financial projections and estimated future cash flows).

[7] 11 U.S.C. § 1129 (a)(7)(A)(ii) (2006).

[8] Evidence of replacement value is rarely brought before the courts in Chapter 11 cases. *But see* Assocs. Commercial Corp. v. Rash, 520 U.S. 953, 959 n.2 (1997) (When a chapter 13 plan proposes to retain and use collateral, section 506(a) of the Bankruptcy Code directs application of a replacement value standard rather than a foreclosure value standard or something in between. "Replacement value" in this context is equivalent to fair market value, i.e., "the price a willing buyer in the debtor' s trade, business, or situation would pay a willing seller to obtain property of like age and condition." The bankruptcy court, as the trier of fact, is charged with determining the best way of

Set forth below is a simple liquidation analysis.

		Liquidation Recovery Percentage		Proceeds Available In Liquidation	
Asset	**Book Value**	**Low**	**High**	**Low**	**High**
Cash	$12,500,000	96%	98%	$11,957,000	$12,229,000
Accounts Receivable	$18,000,000	0%	4%	$0	$720,000
Inventory	$180,000,000	94%	106%	$169,200,000	$190,800,000
Property, Plant and Equipment (PPE)	$50,000,000	3%	8%	$1,500,000	$4,000,000
Gross Proceeds				$182,657,000	$207,749,000
Less: Wind Down Expenses				($28,000,000)	($26,000,000)
Net Proceeds				**$154,657,000**	**$181,749,000**

As one readily sees, a liquidation analysis simply lists the various items of assets owned by the debtors, lists a value for each of these assets (usually book value), determines an appropriate recovery percentage based on the difficulty of liquidating the asset, and multiplies the appropriate recovery percentage by the asset's value. Of course, nothing in life is free. This includes liquidating assets. Thus, the analysis must include an estimate of the amount of money required to liquidate the assets.

2. Discounted Cash Flow (DCF) Valuation

The discounted cash flow or DCF valuation has its foundation in the present value rule under which the value of any asset is the present value of expected future cash flows from it. Thus, a basic understanding of the concept of present value is necessary to understand how a DCF analysis works.

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ascertaining replacement value on the basis of the evidence presented.). *See generally* Till v. SCS Credit Corp., 541 U.S. 465, 489 (2004) (stating that, under *Rash*, "secured creditors are already compensated in part for the risk of nonpayment through the valuation of the secured claim" because *Rash* "utilized a secured-creditor-friendly replacement-value standard rather than the lower foreclosure-value standard for valuing secured claims when a debtor has exercised Chapter 13's cram down option.").

a) Present Value

Consider the following simple example. You own a vacant lot worth $100,000. You are considering constructing a gas station on the lot. The cost of construction would be $300,000. You believe that in one year you will be able to sell the gas station for $450,000. If you decide to go forward with construction, you will be investing $400,000 now in the expectation of realizing $450,000 in one year. You should go ahead with the investment if the present value of the expected $450,000 payoff is greater than the investment of $400,000.

The present value of $450,000 one year from now must be less than $450,000. This is because *a dollar today is worth more than a dollar tomorrow* in that a dollar today can be invested to start earning interest immediately. Thus, the present value of the delayed payoff, i.e., the $450,000, may be found by multiplying the payoff by a discount rate, which is less than 1 (if the discount rate were more than one, a dollar today would be worth less than a dollar tomorrow). The discount rate is expressed as the reciprocal of 1 plus a rate of return:

$$\text{Discount rate} = 1/(1 + r)^t$$

The rate of return is the compensation that an investor demands for accepting the late payment. In this formula, r = the rate of return; and t = the term for which the rate is applicable, e.g., one year, two years, etc. The present value of the investment is the amount expected at the end of the term multiplied by the discount rate.

Back to our example. Assume that the $450,000 payment is a sure thing. The gas station is not the only way to obtain $450,000 a year from now. For example, you could invest in United States government securities maturing in a year. Suppose those securities yield 5% interest. How much would you have to invest in order to receive $450,000 at the end of the year? The answer

is: $450,000/1.05 = $428,571.42.[9] Thus, the present value of the gas station is $428,571.42. Although the building is worth $428,571.42, that doesn't mean you are $428,571.42 better off. Recall, you committed $400,000 to construct the building. Thus, the net present value of the gas station is $28,571.42, i.e., $428,571.42 - $400,000, and you should go ahead with the investment.

Now, assume that all the above facts are the same, but you know that the gas station will be worth $450,000 at the end of *two years*. How does this change the result? The answer is $450,000/$(1.05)^2$ = $450,000/1.1025 = $408,163.27.[10] Thus, the net present value of the gas station in two years is $8,163.27 and, once again, you should go ahead with the investment.

Finally, in the above scenario we made an unrealistic assumption that you can be certain that the gas station will be worth $450,000 in one year. In fact, while that may be your best estimate, there is no way to be certain that the building will be worth that much next year. However, it is virtually assured that the purchase of $428,571.42 worth of United States securities will be worth $450,000 next year. Thus, because *a safe dollar is worth more than a risky dollar* you must use a discount rate greater than the risk free rate of return, i.e., the 5% return on investment in United States securities. Of course, some investments are riskier than others. Constructing the gas station is riskier than investing in government securities but probably less risky than investing in a start-up biotechnology company. So, let's assume that an appropriate discount rate that reflects the risk involved in constructing the gas station is 10%. What is the net present value of the gas station? The answer is $9,099.91, i.e. $450,000/1.10 =

[9] The discount rate = $1/(1 + r)^t = 1/(1 + 0.05)^1 = 1/1.05$. The present value = $450,000 * (1/1.05) = $450,000/1.05.

[10] Again, the discount rate = $1/(1 + r)^t$. Because, you will not receive the payment for two years, you must square the denominator since the 5% in the example is the annual rate. This is nothing more than an extension of the principle that a dollar today is worth more than a dollar tomorrow: *a dollar next year is worth more than a dollar in two years*. So, the discount rate = $1/(1 + r)^t = 1/(1 + 0.05)^2 = 1/1.1025$. The present value = $450,000 * (1/1.1025) = $450,000/1.1025.

$409,099.91 minus the $400,000 initial investment, and you should go ahead with the investment.[11]

b) The Goal of a Discounted Cash Flow Valuation

The goal in a discounted cash flow valuation is to estimate the "intrinsic value" of an asset based on its fundamentals. Intrinsic value is the value that would be attached to the firm by an all-knowing analyst who not only estimates the expected cash flows correctly but also attaches the right discount rate to these cash flows and values them with absolute precision. Of course, precisely determining intrinsic value is impossible, especially with companies that have a substantial uncertainty about their future.

c) The Elements of a Discounted Cash Flow Valuation

The elements of a discounted cash flow valuation are no different from those discussed above concerning net present value, although their derivation and application are much more complex. Basically, a discounted cash flow valuation consists of an estimate of the firm's future cash flows discounted to present value. The complicating factors include determining by what metric one determines the firm's future cash flows, from what source one draws the future cash flows, and how one calculates the appropriate discount rate. Indeed, these issues are so sufficiently complex as to almost certainly require that the valuation be performed by an expert in the field.

Generally speaking, there are three types of discounted cash flow valuations: (i) valuing just the equity stake in the business; (ii) valuing the entire firm, which includes equity and the other claimholders in the firm such as bondholders, preferred stockholders, etc.; and (iii) valuing the firm in pieces beginning with its operations and adding the effects on value of debt and other

[11] If we go back to the previous example where the gas station will be worth $450,000 in *two years*, we finally come to the point where the net present value of the investment is negative and you should *not* go forward: PV = $\$450,000/1.10^2 = \$450,000/1.21 = \$371,900.83$. NPV = $371,900.83 - $400,000 = ***-$28,099.17*.**

non-equity claims. Although all three approaches discount expected cash flows, the relevant cash flows and discount rates are different under each.

The value of equity is obtained by discounting expected cash flows to equity, i.e., the residual cash flows after meeting all expenses, reinvestment needs, tax obligations, and interest and principal payments, at the cost of equity, i.e., the rate of return required by equity investors in the firm. Often, this is done by discounting expected dividends to shareholders.

The value of the firm is obtained by discounting expected cash flows to the firm, i.e., the residual cash flows after meeting all operating expenses, reinvestment needs, and taxes, but prior to any payments to either debt or equity holders, at the weighted average cost of capital (WACC). WACC is the cost of the different components of financing used by the firm (equity, preferred stock, and/or debt) weighted by their market value proportions.

Finally, the value of the firm can also be obtained by valuing each claim on the firm separately. In this approach, which is called adjusted present value (APV), one begins by valuing equity in the firm, assuming that it was financed only with equity. One then considers the value added (or taken) away by debt by considering the present value of the tax benefits that flow from debt and the expected bankruptcy costs. One advantage of this approach is that different cash flows to the firm may be discounted at different rates based upon the specific cash flow's riskiness.

Although all three approaches use different definitions of cash flow and discount rates, they should yield consistent estimates of value as long as one uses the same set of assumptions and valuation. The key error to avoid is mixing apples and oranges by mismatching cash flows and discount rates. For example, discounting cash flows to equity at the cost of capital will lead

to an upwardly biased estimate of the value of equity while discounting cash flows to the firm at the cost of equity will yield a downwardly biased estimate of the value of the firm**.**

d) Using a DCF to Value the Firm

Of the three DCF approaches discussed above, by far the most commonly used before bankruptcy courts is that of valuing the firm by discounting expected cash flows to the firm at the weighted average cost of capital or WACC.[12] The expected cash flows to the firm used in this valuation are generally referred to as the "free cash flow to the firm" or FCFF. A number of metrics are used to calculate the FCFF. These include the "un-levered cash flow," which is the firm's earnings before interest and taxes, net of taxes and reinvestment needs. Another measure of FCFF that is widely used in valuation is the firm's earnings before interest, taxes, depreciation, and amortization (EBITDA). Other measures are earnings before interest and taxes (EBIT); net operating profit or loss after taxes (NOPLAT); or the net operating income (NOI).

The cash flows themselves usually come from management's estimates of the firm's future performance. As such, they are necessarily subject to uncertainty relating to matters specific to the firm as well as to broader issues such as the general state of the economy, advances in technology, effectiveness of management, labor issues, actions of competitors, price of raw materials, etc.[13] Given the inherent uncertainty in predicting the future, one generally only uses 3 to 5 years of projections in performing a DCF analysis. The final year is used to calculate

[12] Bernstein, *supra* note 11, at 187 (stating discounted expected cash flow using WACC among most common and well-accepted approach).

[13] In addition, the projections may be manipulated by management to favor its interests or those of others "friendly" to management. *Compare In re Nellson Nutraceutical*, 2007 WL 201134, at *19 ("In sum, [the controlling equity holder] utilized its control over [the debtor] to manipulate both the business planning and valuation processes to come up with an artificially inflated enterprise value in order to claim some residual value for their existing equity position.") (emphasis in original deleted); *with In re* PTL Holdings LLC, No. 11-12676 (BLS), 2011 WL 5509031, at *3 (Bankr. D. Del. Nov. 10, 2011) ("The financial projections at the heart of this valuation exercise were prepared by the Debtor's management team. The [objecting junior secured lender, which will not receive a recovery under the proposed plan,] strongly criticizes those projections as being premised on unduly pessimistic and faulty assumptions, and contends that the projections were manufactured to produce a valuation that places [the objector] out of the money. The Court finds, however, that the record developed at trial does not support [the objector's] criticism.").

a "terminal value," which is the value of the firm as of the date of the last estimate. For example, were one to use management projections for the next 5 years to perform a DCF, the estimate of the firm's performance in that 5th year would be used to calculate the value of the firm as of that 5th year, i.e. its terminal value. Generally, that is performed by assuming that the cash flows of the firm at that 5th year will grow at a constant rate forever beyond that time. One simply calculates the present value of that perpetual growth as of the 5th year and then calculates the present value as of the date of the valuation of that conclusion.[14]

As mentioned briefly above, the discount rate used in valuing the firm as a whole is usually the weighted average cost of capital or WACC. The WACC is designed to reflect the cost of capital of the firm being valued. Firms generally have three ways to raise capital. They are in the increasing order of riskiness for the investor: debt, preferred stock, and equity. Of course, as riskiness increases the rate of return required by the investor also increases. Thus, the cost of capital to the firm is less for debt than it is for preferred stock and, in turn, both debt and preferred stock are cheaper, i.e., they have a lower cost of capital, than equity.

The formula for the weighted average cost of capital or WACC is, in and of itself, not particularly complicated. The formula is as follows:

$$\text{WACC} = \text{Cost of Equity } [\text{Equity}/(\text{Debt}+\text{Equity})] + \text{Cost of Debt } [\text{Debt}/(\text{Debt}+\text{Equity})]$$

$$\text{Cost of Debt} = \text{Pretax Rate of Debt } (1-\text{Tax Rate})$$

Of course, the devil is in the details! To conclude, set forth below is a **simple** example of a DCF analysis of both the value of a firm's equity and the value of a firm.

[14] The firm's terminal value can have a significant if not dominating influence on the ultimate conclusion as to the firm' s value. As such, an error or manipulation in calculating terminal value can alter the valuation significantly.

Assume one is analyzing the company with the following cash flows for the next 5 years. The value of debt outstanding is $800 and the firm can borrow long-term at 10%.

Year	Cash Flow to Equity	Interest (Long-Term)	Cash Flow to Firm
1	$50	$40	$90
2	$60	$40	$100
3	$68	$40	$108
4	$80	$40	$120
5	$85	$40	$125
Terminal value	$1,600	N/A	$2,360

Assume also that the cost of equity is 13%. The tax rate for the firm is 50%.
Cost of Debt = Pre-Tax Cost of Debt (1 – Tax Rate)
Cost of Debt = 0.1 (1-0.5) = 0.05 = 5%
PV of equity[15] = $(50/1.13) + (60/1.13^2) + (68/1.13^3) + (80/1.13^4) + [(85+1,600)/1.13^5]$
PV of equity = 44.25 + 46.99 + 47.13 + 49.07 + 914.55 = $1,101.99

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WACC = Cost of Equity [Equity/(Debt+Equity)] + Cost of Debt [Debt/(Debt+Equity)]
WACC = .13[1,101.99/[(800+1,101.99)] + .05[800/(800+1,101.99)]
WACC = .13[0.579] + .05[0.421] = 0.075 + 0.021 = 0.096 = 9.6%

***

PV of firm[16] = $(90/1.096) + (100/1.096^2) + (108/1.096^3) + (120/1.096^4) +$
$(125+2,360)/1.096^5]$
PV of firm = 82.12 + 83.25 + 82.03 + 83.16 + 1,571.35= $1,901.99[17]

3. Relative Valuation

In relative valuation, the value of an asset is derived from the pricing of comparable assets, standardized using a common variable such as earnings, cash flows, book value, or revenues. Unlike discounted cash flow valuation, which is a search for intrinsic value, relative valuation relies more on the market. In other words, one assumes that the market is

[15] This is nothing other than a simple calculation of the present value of the cash flow to equity (column 2 above) using a discount rate of the cost of equity, i.e., 13%. As the cash flows go further out in time the discount rate is increased. For example, the rate of return for the 5th year must be raised to the 5th power, e.g., 1.135. For more detail see section 2(a) above.
[16] This is a simple calculation of the present value of the cash flow to firm (column 4 above) using a discount rate of the WACC, i.e., 9.6%. Again, for more detail see section 2(a) above.
[17] Note that the value of the firm's equity is approximately equal to the value of the firm minus the market value of the debt ($800). Indeed, the numbers should be identical. The slight difference here is due to rounding of the figures in order to simplify the example.

correct in the way it prices assets and firms on average, but that it makes errors on the pricing of individual assets and firms.

Finding similar and comparable assets and/or firms is the challenge of a relative valuation. Frequently one has to accept firms that are different from the firm being valued in one dimension or the other. In such a case, one has to either explicitly or implicitly control for the differences. In practice, controlling for these variables can range from the simple-such as using industry averages-to the very sophisticated-such as multi-variant regression models.

Multiples are simple and easy to relate to. They can be used in a relative valuation to obtain estimates of value quickly for firms or assets, and are particularly useful when a large number of comparable firms are being traded on financial markets and the market is, on average, pricing these firms correctly. They tend to be more difficult to use to value unique firms with no obvious comparables, with little or no revenues, or with negative earnings.

By the same token, multiples are also easy to misuse and manipulate, especially when comparable firms and comparable transactions are used. Given that no two firms are exactly alike in terms of risk and growth, the definition of comparable firms is a subjective one. Consequently, a biased analyst can choose a group of comparable firms to confirm his or her biases about a firm's value. Another problem with using multiples based on comparable firms or comparable transactions is that the market might be making errors in valuing the comparable firms. For example, if the market is overvaluing all computer software firms, using the average price to earnings ratio of these firms to value an individual computer software firm will lead to an overvaluation.

The two most common relative valuation methodologies used in chapter 11 cases are the comparable companies analysis and the comparable transactions analysis.[18] Under both methods, one determines a metric by which to value the company such as EBITDA. One then looks to either comparable publicly-traded companies or control transactions involving comparable companies to determine the appropriate multiple to apply to the selected metric to reach a conclusion of the subject firm's value. For example, one may conclude that the firm is worth 8.5x its trailing 12 month EBITDA.

Both these methods are discussed more fully and an illustration for each is provided below.

a) Comparable Companies Analysis

Under the comparable companies analysis, value is calculated by examining the trading ranges of comparable publicly-traded companies. Public companies are used because they are the only ones for which economic data (stock value, revenue, EBITDA, EBIT, etc.) is readily available. Trading ranges are viewed as a multiple of a performance metric, generally revenues, EBITDA, or EBIT. The multiples are then applied to the same metric of the company being evaluated in order to determine its value. The more similar the guideline or comparable companies are, the more supportable is the use of the comparable companies method. Use of companies that are clearly not comparable will lead to unsupportable conclusions.

Now for a simple illustration. Assume you are performing a comparable companies analysis on a glass manufacturing company in bankruptcy. The metric you chose as a determinant of value is the company's EBITDA for the last 12 months (LTM EBITDA), which is $40 million.

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[18] *See* Stan Bernstein, Susan H. Seabury & Jack F. Williams, *The Empowerment of Bankruptcy Courts in Addressing Financial Expert Testimony*, 80 AM. BANKR. L.J. 377, 408 (2006) (recognizing comparable company and comparable transaction methods as "standard methodologies" of valuation).

You determine that the following companies are comparable:

Company	Stock Price	No. of Shares	Market Capitalization (Stock Price x No. of Shares)	LTM EBITDA	Multiple of Market Capitalization to LTM EBITDA
Acme Glass Co.	$10.00	75 million	$750 million	$50 million	15.0
Bird Glass, Inc.	$12.50	100 million	$1.25 billion	$80 million	15.6
Campbell Glass, Inc.	$5.00	100 million	$500 million	$65 million	7.7
Delta Glass, Inc.	$20.00	150 million	$3 billion	$150 million	20.0
				Mean	**14.6**
				Median	**15.3**

Applying the mean multiple of the comparable companies, which is 14.6, to the debtor's LTM EBITDA of $40 million results in a value of $584 million. Applying the median multiple of the comparable companies, which is 15.3, to the debtor's LTM EBITDA of $40 million results in a value of $612 million. Thus, the value of the debtor under the comparable companies analysis is between $584 million and $612 million.

b) Comparable Transactions Analysis

Under the comparable transactions analysis, value is determined by examining the consideration paid to acquire a comparable entity through a publicly reported merger or acquisition. Like the comparable companies analysis, the purchase price is viewed as a multiple of an appropriate earning measure (revenue, EBITDA, or EBIT).[19] Value is calculated by applying the resulting multiple to the same metric of the company being evaluated. Like the comparable companies analysis, the more similar the target company is to the firm being valued, the more confidence one can place in the valuation.

[19] *See* Bernstein, *supra* note 11, at 195 (providing overview of factors in comparable transactions analysis).

Now for a simple illustration. Assume you are performing a comparable transactions analysis on the glass manufacturing company discussed above. The metric you chose as a determinant of value is again the company's EBITDA for the last 12 months (LTM EBITDA), which is $40 million.

You determine that the following transactions are comparable:

Purchaser	Target Company	Purchase Price	LTM EBITDA	Multiple of Purchase price, i.e., value, to LTM EBITDA
Johnson Conglomerate, Inc.	Zeta Glass Corp.	$200 million	$20 million	10.0
Omni Corp.	Yellow Mountain Glass, Inc.	$600 million	$80 million	7.5
Mega-Company, Inc.	X-Ray Glass	$400 million	$80 million	5.0
Monopoly, Inc.	Veri-Glass Corp.	$1.2 billion	$100 million	12.0
			Mean	**8.6**
			Median	**6.3**

Applying the mean multiple of the comparable transactions, which is 8.6, to the debtor's LTM EBITDA of $40 million results in a value of $344 million. Applying the median multiple of the comparable companies, which is 6.3, to the debtor's LTM EBITDA of $40 million results in a value of $252 million. Thus, the value of the debtor as determined by the comparable transactions analysis is between $252 million and $344 million.

4. Contingent Claim Valuation

A contingent claim or option is a claim that pays off only under certain contingencies — if the value of the asset exceeds a pre-specified value for a call option or is less than a pre-specified value for a put option. The premise underlying the use of option pricing models in valuation is that discounted cash flow models tend to understate the value of assets that provide

payoffs that are contingent on the occurrence of an event. For example, consider undeveloped oil reserves. One could value this oil reserve based on expectations of oil prices in the future but this estimate would miss the fact that the oil company will develop the reserve only if oil prices go up and will not if oil prices decline. An option pricing model would yield a value that incorporates this right.

The use of option pricing models in valuation is a relatively new technique and continues to develop.[20] Although there are instances in a bankruptcy when the use of option pricing might be appropriate, such as a start-up pharmaceutical company that is awaiting an FDA decision as to whether its only asset can be brought to market, option pricing is very rarely used in chapter 11 cases.

5. Reaching a Conclusion

Courts have consistently held that the use of actual market data is the preferred method to value an asset.[21] The use of market prices when available and appropriate is entirely consistent with valuation theory. Recall that in using a valuation methodology such as a DCF analysis, the purpose is to determine as accurately as possible what the sale or market price would be, i.e., "price discovery." In the majority of instances in chapter 11 in which valuation is implicated, however, market data will be unavailable or inapplicable.

Hence, in most valuations in chapter 11, the financial professional will perform a DCF, comparable company and comparable transaction analysis. Indeed, these methods are often referred to as the "standard" methodologies.[22] The financial professional then assigns a weight to

[20] *See In re* Capmark Fin. Grp. Inc., 438 B.R. 471, 497 (Bankr D. Del. 2010) (discussing epert's use of valuing guaranty as put option).
[21] *See, e.g.*, *VFB LLC v. Campbell Soup Co.*, 482 F.3d 624, 632–33 (3d Cir. 2007) ("Absent some reason to distrust it, the market price is a more reliable measure of . . . value than the subjective estimates of one or two expert witnesses.") (internal quotations omitted).
[22] *See, e.g.*, *In re* Chemtura Corp., 439 B.R. 561, 573 (Bankr. S.D.N.Y. 2010) (describing DCF, comparable companies and comparable transactions methodologies as "standard").

each of these methodologies based on his or her judgment as to their relative merits and by performing a specific valuation. As with the selection of comparable companies and transactions, the decision as to weighing the three methodologies is a subjective one. The financial professional then applies those weights to come up with a conclusion of value. Usually the valuation conclusion is expressed in a range of values. For example, a professional may determine that a firm is worth between $100 million and $130 million.

Now for our final illustration. Assume a financial professional performs a DCF, comparable companies and comparable transaction analysis and reaches the following conclusions.

Method	Low	High	Mean
DCF	$100 million	$120 million	$110 million
Comparable Companies	$90 million	$100 million	$95 million
Comparable Transactions	$150 million	$185 million	$167.5 million

As you can see, there is a wide range of valuation conclusions between $90 million and $185.5 million.[23] The financial professional concludes that each valuation methodology should be given equal weight and reaches the following conclusions:

Method	Weight	Low	High	Mean
DCF	33.3%	$100 million	$120 million	$110 million
Comparable Companies	33.3%	$90 million	$100 million	$95 million
Comparable Transactions	33.3%	$150 million	$185 million	$167.5 million
Conclusion		$113.2 million	$134.9 million	$124.1 million

[23] The low value of the comparable companies analysis and the high value of the comparable transactions analysis, respectively.

Thus, the financial professional determines that the value of the firm is between $113.2 million and $134.9 million with a mean of $124.1 million.

Now, using the same raw data, the financial professional determines that the comparable transactions analysis is of limited utility because he was able to identify only a few comparable transactions. At the same time, he determines that the DCF analysis is particularly reliable because he has a high level of confidence in the discount rate he applied. Thus, he adjusts the weight of the methodologies and reaches the following conclusions.

Method	Weight	Low	High	Mean
DCF	50%	$100 million	$120 million	$110 million
Comparable Companies	35%	$90 million	$100 million	$95 million
Comparable Transactions	15%	$150 million	$185 million	$167.5 million
Conclusion		$104 million	$122.75 million	$113.4 million

In this instance the financial professional concludes that the value of the firm is between $104 million and $122.75 million with a mean of $113.4 million. This compares with a range of between $113.2 million and $134.9 million with a mean of $124.1 million when the methodologies are weighted equally. One can readily see that the adjustments in the weight in the second example result in a slightly lower conclusion of the firm's value.[24]

6. The Court

It is important to remember that bankruptcy judges have become familiar and comfortable with the DCF, comparable companies and comparable transactions methodologies. Indeed, these methods are often referred to as the "standard" methodologies.[25] Of course, there are other valuation methodologies such as contingent claim valuation. While use of an

[24] $113 million vs. $124.1 million.
[25] *Chemtura*, 439 B.R. at 573.

"alternative" valuation may be appropriate, one should be reluctant to depart from the familiar. The judge will be inherently suspicious of the use of such an alternative valuation. The valuation professional should be prepared to provide a clear reason for not using the DCF, comparable companies and/or comparable transactions methodologies. Otherwise, the judge may suspect that the professional is manipulating the valuation to reach a predetermined result and, thus, will give the valuation little or no weight.

In addition, when using an "alternative" valuation one risks confusing the judge. Remember, most bankruptcy judges are "self-taught" in corporate finance. The financial professional should be prepared to provide a clear explanation of the valuation methodology. A more careful and complete explanation than that required when using the DCF, comparable companies and comparable transactions methodologies will be necessary. If the judge is confused or does not understand the methodology he or she will likely give the valuation little or no weight.

Finally, in performing valuations, financial professionals often make "adjustments" to the selected methodology. For example, a financial professional may add an additional "risk premium" to the WACC in performing a DCF valuation. As with the use of "alternative" valuation methodologies, judges are inherently suspicious of these adjustments. The concern is that the adjustment is being made to manipulate the valuation to reach a predetermined result. This is particularly the case when all of the adjustments tend to move the conclusion of value in favor of the financial professional's client. Thus, a financial professional making such an adjustment should be prepared to provide a clear reason for it. In addition, one should be prepared to defend that adjustment on cross examination. The simple solution is to make as few adjustments as possible.

Faculty

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