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I. INTRODUCTION

Appraisal is a right and a remedy. Available by statute in all states, appraisal provides dissenting shareholders the right to require the corporation to pay them the 'fair value' of their shares upon some mergers or other fundamental changes. Appraisal statutes provide procedures for dissenting shareholders to receive a judicial hearing in which the court appraises the value of their interests. A primary purpose of appraisal statues is to protect minority shareholders. The intent of appraisal valuations by courts is to compensate dissenting minority shareholders equitably for the unwanted change in their investments.

Section 262 of the Delaware General Corporation Law ('DGCL') entitles dissenting stockholders to refuse cash, stock or other consideration provided by a merger agreement and allows them to demand payment in cash of the fair value of their shares. A dissenting stockholder may enforce the right by commencing an appraisal proceeding in the Delaware Court of Chancery against the corporation surviving the merger. A decision by the Court of Chancery in an appraisal proceeding may be appealed to the Delaware Supreme Court.

Section 262 contains exceptions and procedural requirements, which must be met. However, the purpose of this article is to discuss the important role of the Delaware courts in the development and application of business valuation methods. Thus, exceptions and procedural issues will be discussed only as necessary to understand the court decisions on business valuation methods.

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Numerous appraisal proceedings are commenced in the Delaware Court of Chancery. The amounts involve many millions and even billions of dollars. The attorneys for the parties call expert witnesses who are often leaders in the field of business valuation. Thus, the Chancellors who make the business valuation decisions have extensive information to use in reaching their findings, although they must evaluate the quality of the information.

Section 262(h) provides that the Court of Chancery shall consider all relevant factors in determining fair value. The statutory language requires that the value determined must be fair and does not say "fair market value." Evidence of market value may be offered, but it is a part of "all relevant factors." Relevant factors may include asset value, dividend records, earnings prospects, and any additional factors that may relate to financial stability or prospect for growth.[1]

Historically, the Delaware courts used a weighted average business valuation method called the "Delaware Block Method." Its elements were assets, market prices, and earnings multiples. That changed after the testimony of the expert witness, Kenneth Bodenstein of Duff & Phelps, who presented two other methods. They were (1) comparative analysis of premia paid in other acquisition transactions and (2) discounted cash flow (DCF) analysis. The Chancellor heard Mr. Bodenstein's testimony but did not accept his methods. However, upon appeal, the Delaware Supreme Court granted a new hearing and directed that proof of value should in the future include any techniques or methods that are generally considered acceptable in the financial community and are otherwise admissible in court.

Since the 1983 decision in *Weinberger v. UOP, Inc.*, [2] the DCF method has been regularly presented as part of the testimony of expert witnesses in major appraisal proceedings and often, but not always, used as a basis for decisions by the Delaware Court of Chancery. Other methods often presented include (1) the deal price negotiated by the parties to the merger agreement (2) a comparable value analysis based on comparison of companies with privately

1. Andaloro v. PFPC Worldwide, Inc., 2005 Del. Ch. LEXIS 125; 2005 WL 2045640 (Del. Ch. Aug. 19, 2005).

2. *See generally* Weinberger v. UOP, Inc., 426 A. 2d 1333 (Del. Ch. 1981); rev. 457 A. 2d 701 (Del. 1983).

owned shares to comparable companies having publicly traded shares[3], and (3) a comparison of the transaction price proposed by the dissenting shareholders to the transaction prices of other recent comparable merger and acquisition transactions.

In these methods, the value of any synergies gained by a third-party acquirer is subtracted. The question of the magnitude of synergies may be a vigorously litigated issue in appraisal proceedings. We address that matter in Section 3.

II. SOME BASIC REQUIREMENTS AND RESTRICTIONS

At the outset, Section 262 and its interpretations by the Delaware Supreme Court impose some threshold requirements and restrictions on the valuation methods that may be used by the Court of Chancery to determine fair value.

First, "fair value" is the value of the petitioners' shares determined on a "going concern" basis. This means that the "fair value" is the value of the shares held by the petitioners if the consolidation transaction had not occurred and if the acquired company had continued to operate its business independently. The underlying theory is that a dissenting stockholder is entitled to receive the value of what he relinquished in the merger to which he objected— i.e., his proportionate share of the corporation as a going concern.[4] Thus, for example, liquidation value is not an acceptable method.

Second, fair value must exclude any element of value arising from the accomplishment or expectation of the merger. The parties to a friendly merger often assert that the exploitation of potential synergies is the main (or a main) putative motivation for the merger. Sometimes those synergies are real and sometimes they turn out to be merely wishful thinking.[5] Moreover, the sources of synergy

3. A recent Court of Chancery decision spoke to the methodology of comparability: "A comparable company's analysis is relevant only when the companies selected are truly comparable…. The selected companies need not be a perfect match; however, to be useful the methodology must employ a good sample of actual comparable." In re Appraisal of SWS Group, 2017 WL 2334852 (Del. Ch. May 30, 2017); *aff'd* sub nor. Merlin Partners v. SWS. Group, Inc., 2018 Del. LEXIS 77 (Del. Feb. 23, 2018).

4. In re Appraisal of The Orchard Enterprises, Inc., 2012 WL 292 3305; Del. Ch. LEXIS 165 (Del.Ch. Jul. 18, 2012) 2012), *aff'd,* 2013 LEXIS 155 (March 28. 2013).

5. For example, Hewlett-Packard announced in September 2001 that they would acquire Compaq Computer in an all-stock purchase valued at $25 billion. The acquisition

may become issues in antitrust litigation as well as appraisal litigation.[6] The questions of the existence of synergies and their measurements in appraisal proceedings is so significant that Section 3 undertakes a discussion of the salient issues.

Third, except for appraisals where controlling shareholders have the burden to prove "entire fairness" after a transaction such as a "going private" merger, the burden of proof is on both the petitioner and the respondent to prove what each claim to be fair value.[7] If they fail to do so, the Court of Chancery may reject their evidence in whole or part in making its determination of fair value. The Court of Chancery has the power to appoint its own expert witness if it wishes to do so.[8]

Fourth, when the discounted cash flow (DCF) method is used, no minority discount[9] is subtracted or control premium added.[10] The financial/empirical theory of the minority discount is this: no matter how liquid and informed the financial markets may be, all publicly traded shares persistently and continuously trade in the market at a substantial discount relative to their proportionate share of the value of the corporation. This discount, it is said, arises because the stock prices on national securities markets represent "minority" positions, and minority positions trade at a discount to the value of the company's equity. Consider the Delaware Supreme Court's observation in *Cavalier Oil Corp. v. Hartnett*[11]:

was at that date the world's largest information technology merger in history. The synergies expected by HP did not materialize. The merged "new" HP lost half of its market value and the company incurred heavy job losses. The CEO resigned in 2005.

6. Matthew Rhodes-Kropf and David Robinson, *The Market for Mergers and the Boundaries of the Firm,* J. OF FIN., June 2008. Addressed a related question of who buys whom. Contrary to conventional wisdom, they argue that it does not appear that firms with relatively high market value tend to buy firms with relatively low market value. Instead, they show firms tend to pair with other firms having similar financial ratios.

7. In re Appraisal of The Orchard Enterprises, Inc., *supra* note 4.

8. M.G. Bancorporation, Inc. v. Le Beau, 737 A. 2d 513, 525 (Del. 1999); Cede & Co. v. Technicolor, Inc., 684 A. 2d 289, 290 (Del. 1996) *aff'd* in part 884 A.2d 26 (Del. 2005).

9. A minority discount reflects the notion that a partial ownership interest may be worth less than its pro-rata (proportional) share of the total business. For example, ownership of a 10% share in the business may be worth less than 10% of the entire company value.

10. A control premium is the amount that a buyer is willing to pay over and above the current market price in order to acquire a controlling interest in that specific company. This premium can be substantial when a target company owns crucial intellectual property, real estate, or other assets that an acquirer wishes to own.

11. Cavalier Oil Corp. v Hartnett, 564 A.2d 1137 (Del. 1989).

> *"Where there is no objective market data available, the appraisal process is not intended to restruct* [sic.] *a pro forma sale but to assume that the shareholder was willing to maintain his investment position, however slight, had the merger not occurred. Discounting individual share holdings injects into the appraisal process speculation on the various factors which may dictate the marketability of minority shareholders. More important, to fail to accord to a minority shareholder the full proportionate value of his shares imposes a penalty for lack of control, and unfairly enriches the majority shareholders who may reap a windfall from the appraisal process by cashing out a dissenting shareholder, a clearly undesirable result."*[12]

Fifth, Section 262(b) of the DGCL excludes appraisal rights (with some exceptions) for shares either (i) listed on a national securities exchange or (ii) held by record by more than 2,000 holders.

As the years have passed, the Court of Chancery has gained extensive experience with business valuation methods. That is important and necessary because the fair value determinations are made by the Court of Chancery. The Chancellor hears and evaluates testimony and documents of expert witnesses retained by the dissenting stockholder petitioners and the respondent corporations and often uses them in reaching its determinations of fair value. However, the Chancellors do so to the extent that they accept the testimony and documentary evidence as admissible and credible.

III. THE EVALUATION AND JURISPRUDENTIAL TREATMENT OF SYNERGIES IN APPRAISAL PROCEEDINGS[13]

As a practical matter, nearly every time one company launches a takeover bid for another, the justification is about synergies. The more

12. In re Appraisal of The Orchard Enterprises, *supra* at note 4; Cavalier Oil Corp v Hartnett *supra*..

13. A thorough description of the source(s) of synergies can be found in STEPHEN ROSS, RANDOLPH WESTERFIELD, JEFFREY JAFFE, AND BRADFORD JORDAN, CORPORATE FINANCE 880-886 (McGraw-Hill Education, 12th ed. 2019).

and bigger they are the better the deal for both parties to the transaction. Microsoft's announced $26 billion all cash offer for LinkedIn in 2016 is an example. In that transaction the CEOs of both companies and the media all focused on the synergies in communicating and discussing the deal.[14] In an appraisal proceeding in which one of the issues is the application of the "going concern" theory, a resolution of the analytical question of how to measure the putative synergies may be dispositive of the case.

Fair value does not include value which may be claimed for "synergies" gained by an acquirer from accomplishment or expectation of a merger. In the context of a merger, the manifestation of synergies (if they are truly significant) means that the interaction of the merging business units, when combined, will produce a total effect on the earnings of the combination that exceeds the sum of the earnings of the individual business units antedating their merger.[15] Thus, to be consistent with the "going concern" theory of valuation, and as implicitly mandated by the appraisal statute, going concern value does not include, for example, synergies that are expected from the merger itself.

The legal significance of synergies in an appraisal proceeding has been addressed by the Delaware Court of Chancery as recently as 2019. In the case *In Re Appraisal of Columbia Pipeline Group*,[16]

Chancellor Laster summarized the jurisprudential significance of synergies in merger appraisal proceedings:

> [*I*]*t is widely assumed that the sale price in many M&A deals includes a portion of the buyer's expected synergy gains, which is part of the premium the winning buyer must pay to prevail and obtain control*."[17]
>
> *"In an arm's-length, synergistic transaction, the deal price generally will exceed fair value because target fiduciaries bargain for a premium that includes . . . a share of the anticipated synergies . . .."*[18]

14. Todd Zenger, *Do M&A Deals Ever Really Create Synergies?*, HARV. BUS. REV., July 6, 2016.

15. Economists have long been familiar with the significance of synergies. They can be manifested as economies of scale and/or economies of scope. For a technical discussion, s*ee Luke M. Froeb, Brian T. McCann, Michael R. Ward, and Mike Shor, Managerial Economics* 86-91 (Cengage Learning, 5th ed. 2018).

16. *In re* Appraisal of Columbia Pipeline. Grp., Inc., 2019 WL3778370 (Aug. 2019).

17. DFC Global Corp. v Muirfield Value Partners, L.P., 172 A.3d 346, 371 (Del. 2017).

18. Olson v ev3, Inc., 2011 WL 704409 1, 10 (Feb. 21, 2011).

> *"[S]ection 262(h) requires that the Court of Chancery discern the going concern value of the company irrespective of the synergies involved in a merger."*[19]
>
> *To derive an estimate of fair value, the court must exclude "any synergies or other value expected from the merger giving rise to the appraisal proceeding itself . . .."*[20]
>
> *"Of course, estimating synergies and allocating a reasonable portion to the seller certainly involves imprecision, but no more than other valuation methods, like a DCF analysis . . .."* [21]

The problematic issues are the difficulty of identifying and analytically disentangling economic synergies, if any, exploited by the merged firm from the going concern valuation of the firm antedating the merger. An explication of the taxonomy and manifestation of synergies may be helpful to attorneys litigating the issues in an appraisal proceeding.[22]

We consider an analytical definition amenable to quantification: Synergy occurs if the value of the combined firm after the merger is greater than the sum of the value of the value of the acquiring firm and the acquired firm while they operated independently before their merger.[23]

Here is an illustration of the methodology that can be applied to measure synergy in a case of publicly traded corporations. Consider two independent public corporations: Mongoose Enterprises, Inc., and Cobra Corporation. It is reasonable to assume that for public corporations, the pre-merger value to their stockholders can be determined by observing the market prices of the outstanding securities. Suppose the symbol V_M represents the pre-merger value of Mongoose and the symbol represents V_C represents the pre-merger value of Cobra. The symbol $V_{M, C}$ represents the market value of the combined firm.

19. MPM Enterprises, Inc. v. Gilbert, 731 A.2d 790, 797 (Del. 1999).

20. Global GT LP v. Golden Teleco, Inc., 993 A.2d 497, 507 (Del. Ch. 2010).

21. Verition P'rs Master Fund Ltd. v. Aruba Networks, Inc., 210 A.3d 128, 141 (Del. 2019).

22. A description of the sources of synergy appears in *Corporate Finance*. STEPHEN ROSS ET AL., CORPORATE FINANCE 880-86 (12TH ED. 2019).

23. *See* DIWAKAR GUPTA & YIGAL GERCHAK, QUANTIFYING OPERATIONAL SYNERGIES IN A MERGER/ACQUISITION 517-33 (2002).

The difference between the value of the combined firm and the sum of the values of the firms operating as independent entities measure the aggregate economic value of the synergies, if any, flowing from the acquisition.[24]

Aggregate dollar value of synergy from the combination

$$= V_{M,C} - (V_M + V_C)$$

This method of measuring the dollar value of the total synergy generated by the merger avoids the biases that can (and often do) infect the pre-merger subjective expectations and statements of management in one or both companies.[25] The measurement above reflects the consensus of the expectations of the stockholders. In appraisal litigation, stockholder valuations have the advantage of being directly measurable and representative of a diversity of opinion.

If one or both companies are not public corporations, the measurement of synergistic effects generally requires more calculation. Briefly, what is required is a calculation of the net present value of three companies. Let the symbol NPV_M represent the net present discounted value of the pre-merger earnings projected for Mongoose; the symbol NPV_C represents the net present discounted value of the pre-merger earnings projected for Cobra; and the symbol $NPV_{M,C}$ represents the net present discounted value of the post-merger earnings. The synergies generated by the merger can be estimated by the formula:

Aggregate dollar value of synergy from the combination

$$= NPV_{M,C} - (NPV_M + NPV_C)$$

The methodology of present value discounting is explained in Section 4 below.

24. *See* PATRICK A. GUAGHAN MERGERS, ACQUISITIONS AND CORPORATE RESTRUCTURINGS 115 (3RD ED. 2002).

25. Michael Goold & Andrew Campbell, *Desperately Seeking Synergy*, HARV. B. REV. 131, 143 (1998) (explicating the unbounded enthusiasm regarding expected synergies displayed by management in companies contemplating a merger).

IV. THE DISCOUNTED CASH FLOW (DCF) METHOD

In a decision in 2018 the Chancery Court expressed this concise statement of the DCF method:[26]

> *"[A] DCF analysis can provide the court with a helpful data point about the price a sale process would have produced had there been a robust sale process involving willing buyers with thorough information and the time to make a bid.*
>
> *The basic premise underlying the DCF methodology is that the value of a company is equal to the value of its projected future cash flows, discounted to the present value at the opportunity cost of capital. Calculating a DCF involves three steps: (1) one estimates the values of future cash flows for a discrete period, where possible, based on contemporaneous management projections; (2) the value of the entity attributable to cash flows expected after the end of the discrete period must be estimated to produce a so-called terminal value, preferably using a perpetual growth model; and (3) the value of the cash flows for the discrete period and the terminal value must be discounted back using the capital asset pricing model or "CAPM." In simpler terms, the DCF method involves three basic components: (1) cash flow projections; (2) a discount rate; and (3) a terminal value."*

The Court of Chancery has called the DCF method *". . . a well-established method of determining the going concern value of a corporation."*[27] In an appeal, however, the Delaware Supreme Court reversed the decision of the Court of Chancery. The Delaware Supreme Court said during the explanation of its adoption of the deal price as the fair value of Dell, Inc.'s shares:

> *"Although widely considered the best tool for valuing companies when there is no credible market information and*

26. Blueblade Capital Opportunities, LLC v. Norcraft Cos., Inc., C.A. No. 11184-VCS LEXIS 255 at *76-77 (Del. Ch. July 27, 2018).

27. In re Appraisal of Dell Inc., C.A. No. 9322-VCL, LEXIS 81 at *148 (Del. Ch. May 31, 2016); *see generally* Dell, Inc. v. Magnetar Global Event Driven Master Fund Ltd., No. 565, 2016, Del. LEXIS 518 (Del. Ch. Dec. 14, 2017).

> *no market check, DCF valuations involve many inputs – all subject to disagreement by well-compensated and highly credentialed experts – and even slight differences in these inputs can produce large valuation gaps."*

The Court of Chancery has found a number of concerns about the testimony of some expert witnesses who used the DCF method, including experts with prestigious reputations. As a result, the Chancellors have sometimes accepted expert testimony only in part or with modifications. They have also sometimes given expert testimony no weight if they found it to be unsupported or unrealistic. However, cash flows are routinely used in DCF models accepted by the Delaware courts. [28]

The Court of Chancery has correctly observed, "*Methods of valuation, including a discounted cash flow analysis, are only as good as the inputs to the model*."[29] Because decisions in the Court of Chancery are often closely focused on one (or more) critical assumptions of the DCF model, we display in this section the anatomy of the model. Many of the critical assumptions are numerical constants, called "parameters."

A. CASH FLOW PROJECTIONS

First, the DCF model requires the user (or users) to obtain or prepare a forecast of the company's future cash flow stream on an annual basis for each year of a well-defined finite time into the future.[30]

Chancellor Strine observed: "*The most important input necessary for performing a proper DCF is a projection of the subject company's cash flows. Without a reliable estimate of cash flows, a DCF analysis is simply a guess.*"[31]

28. *See generally* Merion Capital, L.P. v. 3M Cogent, Inc., Civil Action No. 6247-VCP, LEXIS 172 at *12-15 (Del. Ch. July 8, 2013) (calculating free cash flows); *Blueblade*, 2018 Del. Ch. LEXIS 255, at *36-39.

29. *See generally* Huff Fund Investment Partnership v. CKx, Inc., Civil Action No. 6844-VCG, 2014 WL 545958 (Del. Ch. Feb. 12, 2014), 2013 Del. Ch. LEXIS 262 (Oct. 31, 2013) and Neal v Alabama By-Products Corp., 1990 WL 109243 at 9.

30. The Delaware Court of Chancery has long expressed its strong preference for management projections. *See* In re Appraisal of SWS Group, C.A. No. 10554-VCG, 2017 WL 2334852 at *30 (Del. Ch. May 30, 2017).

31. Del. Open MRI Radiology Assocs., P.A. v. Kessler, 898 A.2d 290, 332 (2006).

One can find diverse professional opinions as to the appropriate definition of the cash flows to be forecasted. Economic experts will often differ respecting the definition and method of calculating the cash flows to be forecasted. Those definitions include line items appearing on almost all financial statement, including: Earnings Before Interest, Taxes, Depreciation, and Amortization (symbolized by EBITDA) and accounting for capital expenditures. Those capital expenditures consist of the money a company spends on maintaining and upgrading its capital stock.[32]

Because they are significant cash outflows, it is important to subtract from EBITDA appropriate amounts of both maintenance and discretionary capital expenditures (CAPEX). Maintenance capital expenditures are typically for repairs and minor improvements to equipment with lives longer than one year and can be subtracted in full.

However, an appropriate amount for discretionary CAPEX can be less clear. For example, after a leveraged buyout, CAPEX considered by the buyers to be discretionary is often deferred until high-risk acquisition debt is reduced. On the other hand, discretionary CAPEX should not be deferred longer than necessary, or the business might find that those of its competitors who continued their discretionary CAPEX have gained competitive advantages. For business valuation purposes, one resolution may be to "normalize" discretionary CAPEX. Recently, the Delaware Court of Chancery discussed testimony of two expert witnesses on terminal values and explained that in order to support an assumption of a perpetual growth rate exceeding inflation in a DCF projection, a firm must invest in capital expenditures sustainable at a rate exceeding the rate of projected depreciation.[33]

For the purpose of this article, we define cash flow as the annual earnings the premerger company can be expected to generate before interest, taxes, depreciation, and amortization minus the capital expenditures required if the pre-merger company is to at least maintain and upgrade its existing capital in such a way as to remain

32. Free cash flow represents the cash a company generates after cash outflows to support operations and maintain its capital assets. Unlike earnings or net income, free cash flow is a measure of profitability that excludes the non-cash expenses typically appearing on an income statement and can include spending (if any) on equipment and asserts as well as changes in working capital. Kruse v. Synapse Wireless, Inc., 2020 Del. Ch. LEXIS 238, 2020 WL 3969386, at *29-30 (Del. Ch. July 14, 2020).

33. In re Appraisal of Ancestry.com. Inc., 2015 WL 399726; 2015 Del.Ch. Lexis 21 (June 30,2015)

reasonably competitive with other firms in its market(s).[34] In this paper, we represent an annual cash flow to the company by the symbol CF. It is defined as:

$$CF = EBITDA - CAPEX$$

If the parties can agree on the definition of the annual cash flows, the next step requires a decision as to how many years cash flows are to be projected.[35]

The economic logic of the appraisal proceedings dictates that the projection of the acquired company's cash flows should begin in the year when the company would have continued to conduct its ordinary business operations but for the acquisition. The earnings generated by its ordinary business operations, absent the acquisition, would not have manifested any synergistic effects of the acquisition.[36]

The choice of the projection period (e.g., 5 years, 10 years, etc.) will often reflect a congeries of financial, technological, industry and political influences. To simplify this exposition, we (arbitrarily) assume the parties agree to forecast the cash flows annually each year for 10 years into the future. That is, the annual cash flows are projected for each of the years 2021, 2022, 2023, . . . 2030.

The projection of the pre-merger cash flow in the year i is symbolized CF_i, where the subscript i assumes successive values, 1, 2, 3, 10; each subscript designates the future year the annual cash flow is projected. For example, CF_1 represents the projected value of the pre-merger annual cash flow one year into the future; CF_2 represents the projected annual value of the pre-merger cash flow two years into the future, etc. When these

34. The discretionary capital expenditures necessary for upgrading a firm's capital assets will vary greatly with respect to the rapidity of technological innovation in the market(s) where it competes.

35. If management projections are used as the basis for the DCF calculation, they will show the projection period. A recent example of a 5 year projection can be found in *in Re Appraisal of Panera Bread Company*, Court of Chancery, decided January 1, 2020. In Re Appraisal of Panera Bread Company, C.A. No. 2017-0593-MTZ, (Del. Ch. Jan. 31, 2020).

36. The corporation "must be valued as a going concern based upon the 'operative reality' of the company as of the time of the merger," considering its particular market position in light of future prospects. M.G. Bancorporation, Inc. v. Le Beau, 737 A.2d 513, 525 (Del. 1999) (quoting Cede & Co. v. Technicolor, Inc., 684 A.2d 289, 298 (Del. 1996)); *accord* Dell, Inc. v. Magnetar Global Event Driven Master Fund Ltd., 177 A.3d 1, 20 (Del. 2017). *Technicolor*, 684 A.2d at 298. Consequently, the trial court must assess "*the value of the company . . . as a going concern, rather than its value to a third party as an acquisition*." MPM Enterprises v. Gilbert, 731 A.2d 790, 795 (Del. 1999). Put differently, the valuation date is the date on which the merger closes. *Technicolor*, 684 A.2d at 298; *accord* M.G. Bancorporation, 737 A.2d at 525.

projections are carried out, the result is a series of annual cash flows symbolized by:

$$\{CF_1, CF_2, \cdots CF_{10}\}$$

The third step in the application of the *DFC* model requires a selection of a numerical value for the discount rate. Economic experts will often differ very sharply respecting the "correct" numerical value of the discount rate to apply. This is another issue we finesse by assuming it has been resolved. We will return to this issue in Section B below. The numerical value of discount rate is symbolized by r.

When all the numerical pieces are in place, the DCF is calculated as:

$$DCF = \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \cdots + \frac{CF_{10}}{(1+r)^{10}}$$

$$+ \ discounted\ value\ of\ residual\ growth$$

The formula appearing above can be found in any college-level textbook on corporate finance or banking.

The last term in the sum, namely the $discounted\ value\ of\ residual\ growth$, represents the sum of the discounted value of the cash flows accruing to the company for all the years after last year in which the annual amounts of the cash low are projected. In this example, the values of the annual cash flows are projected for each of the years from 1 to 10. Thus, there are 10 individual annual terms in the DCF sum. However, the (rebuttable) presumption is that the company will not liquidate after year 10. The company is expected to continue its business operations in years 11, 12, 13, etc. The *discounted value of residual growth* is the calculation of the discounted value of the sum of the cash flows in years 11, 12, 13, ad. inf.

It is obvious that any significant change in one or more of the components of the cash flow steam will have a predictable mathematical effect on the DCF.

The following paragraphs discuss how the Court of Chancery and Delaware Supreme Court have treated some important inputs to DCF analysis.

The Court of Chancery has recognized in numerous decisions the importance to the DCF method of reliable projections of future cash flows. The Court of Chancery has repeatedly expressed a preference for contemporaneously prepared management projections produced in the ordinary course of business.[37] The preference does not apply, however, to

37. Doft & Co. v. Travelocity.com Inc., 2004 Del. Ch. LEXIS 75, 2004 WL 1152338, at *21-22 (Del. Ch. May 20, 2004).

projections prepared by management with limited experience preparing projections and who were at risk of losing their positions if an opposing bid succeeded.[38]

As Vice Chancellor Sam Glasscock said in his opinion on the valuation of SWS Group, Inc.:

> *"Naturally, prior appraisal decisions have recognized that it is proper to be skeptical of "post hoc, litigation-driven forecasts" by experts. Similarly, the cash flow projections have been described by this Court as the "most important input" in performing a DCF, and that absent reliable projections "a DCF analysis is simply a guess."*[39]

Projections of cash flows include achievable (but not speculative) cost savings and additional revenues from achievable (but not speculative) acquisitions during the projection period. In an appraisal of a corporation which operated facilities offering open MRI radiology services, for example, the Court of Chancery held that projected cash flows included those of (1) two facilities in successful operation before a merger, (2) two facilities established about the time of the merger, and (3) one facility not established until over a year after the merger but planned to be part of a network of facilities throughout Delaware.[40] It should be noted that this appraisal followed a "squeeze out" merger arranged by five radiologists who owned 62.5% of the corporation's stock in order to eliminate the minority ownership of 37.5% of the stock by three other radiologists. Thus,the five majority stockholders had the burden to prove the entire fairness of all aspects of the merger.

In a proceeding where management projections were not prepared in the ordinary course of business and included increases of licensing revenues from television programs and other intellectual property rights which were subject to uncertain future negotiations, the Court of Chancery found that the projected increases were "little more than guesswork" and declined to use the DCF method entirely.[41]

In a recent decision, the Court of Chancery identified several flaws that made cash flow projections unreliable. In brief summary, the Court

38. Gearreald v. Just Care, Inc., 2012 Del. Ch. LEXIS 91, 2012 WL 1569818, at *17-18 (Del. Ch. Apr. 30, 2012)).

39. In re Appraisal of SWS Group, C.A. No. 10554-VCG, 2017 WL 2334852 at *31-32 (Del. Ch. May 30, 2017).

40. Del. Open MRI Radiology Assocs., P.A. v. Kessler, 898 A.2d 290, 323-24 (Del. Ch. 2006).

41. Huff Fund Inv. P'ship v. CKx, Inc., 2013 Del. Ch. LEXIS 262, at *9, 13 (Del. Ch. Nov. 1, 2013), aff'd, 2015 Del. LEXIS 77, (Del. Feb. 12, 2015); *see also* Doft at *21-22.

found that the projections were prepared by a new management not in the ordinary course of business and using a new method which they never used before. Management had a poor track record for accuracy of projections. Management also used unreliable assumptions such as a projected commencement of important deliveries by a supplier lacking technological capability and already lagging behind in its deliveries. Management further relied on distortions such as an inventory buildup which resulted from customer over ordering after being placed on an allocation. Management also relied on financial information, which the Court found was distorted by "channel stuffing", to meet goals for one quarter that adversely affected the next quarter.[42]

For another quite dramatic example, a chief executive and controlling shareholder seeking to take his company private in a "squeeze out" merger was found to have committed fraud by arranging to conceal from projections made for a DCF valuation being prepared for a board committee $30 million of cost savings and profits from farms acquired in Central America.[43] The concealment made the corporation appear less valuable and reduced the merger price. The Court of Chancery held the chief executive and controlling stockholder liable for over $148 million.[44]

The important effects of income taxes on cash flow projections are treated realistically by the Court of Chancery. Academic textbooks tell students that the marginal tax rates should be used to calculate the amounts of tax liability. However, the Court of Chancery uses rates and amounts realistically expected to be paid during the projection period, including a recognition that it is unlikely that a domestic corporation will repatriate earnings of its foreign subsidiaries remaining after they have paid foreign taxes. For example, in the valuation of Dell, Inc., the Court of Chancery adopted a 21% tax rate, which was held permissible on appeal by the Delaware Supreme Court. The Court of Chancery has also held that no embedded capital gains tax on a portfolio of securities should be subtracted in projecting cash flows in the absence of evidence that the securities will be sold.[45]

42. LongPath Cap., LLC v. Ramtron Int'l Corp., 2015 Del. Ch. LEXIS 177, 2015 WL 4540443, at *50 (Del. Ch. June 30, 2015).

43. A squeeze-out, sometimes synonymous with freezeout, is the compulsory sale of the shares of minority shareholders for which they receive a cash compensation. The shareholders using this technique are then in a position to dictate the plan of a merger.

44. In re Dole Food Co., Inc. S'holder Litig., 2015 Del. Ch. LEXIS 223, 2015 WL 5052214, at *7 (Del. Ch. Aug. 27, 2015).

45. Berger v. Pubco Corp., Civil Action No. 3414-CC, (Del. Ch., May 10, 2010) The citation is to a decision letter addressed counsel by Chancellor Chandler denying a reduction in the value of Pubco's securities based on a projected capital gains tax liability.

The Court of Chancery also determined the effects of a Subchapter S election on the value of minority shares of three radiologists that were eliminated by a "squeeze out" merger arranged by majority shareholders. In order to avoid a windfall to either the petitioners or the respondents, the Court focused on the amount of the Subchapter S tax benefit, which was taken away from to minority stockholders. The Chancellor calculated that each would pocket $60 out of $100 of the income of a Subchapter S corporation, but only $51 of $100 of income of a Subchapter C corporation. Thus, the Court concluded that income of the Subchapter S Corporation should be "tax affected" at a rate of 29.4%.[46]

The Court of Chancery has discussed net operating loss (NOL) carryforwards and the effect they have to reduce taxes and, thus, to increase cash flow projections.[47] In that decision, the Court also discussed the relation of capital expenditures (CAPEX) and depreciation.

The Court of Chancery correctly treated stock-based compensation (SBC) as noncash expense.[48] The Court recognized that SBC causes dilution of the stock held by holders of previously outstanding stock, but dilution is not cash expense. Of course, if a corporation pays cash to buy the stock used to pay SBC in order to prevent dilution, the cash paid is cash expense. Any tax deductions, which may result from the payment of SBC, also affect cash projections because they save cash if allowed. In a more recent appraisal, however, the Court of Chancery adopted expert testimony adjusting earnings to consider the dilution effect of SBC.[49]

B. THE DISCOUNT RATE

The Court of Chancery uses, as expected, the weighted average cost of capital (WACC) as the discount rate when applying the DCF model. The WACC is a composite cost of various specific sources of funds including, common stock, long-term debt, preferred stock (if any) and retained earnings. The WACC is the overall rate of return the firm must earn on its existing assets to maintain the value of its stock. The objective of any well-

The Chancellor also denied a control premium because the value was determined by the DCF method.

46. Del. Open MRI Radiology Assocs., P.A. v. Kessler, 898 A.2d 290, 336 (Del. Ch. 2006). The same method was subsequently used again in Owen v. Cannon, 2015 Del. Ch. LEXIS 165, 2015 WL 3819204, at *23 (Del. Ch. June 17, 2015).

v. Cannon, 2015 WL 3819204 (Del. Ch. June 17, 2015).

47. In re Appraisal of the Orchard Enters., 2012 Del. Ch. LEXIS 165, 2012 WL 2923305, at *47-48 (Del. Ch. July 18, 2012).

48. Merion Capital, L.P. v. 3M Cogent, Inc., 2013 Del. Ch. LEXIS 172, 2013 WL 3793896, at *44-46 (Del. Ch. July 8, 2013).

49. In re Appraisal of Ancestry.com, Inc., 2015 Del. Ch. LEXIS 2, 2015 WL 66825 (Del. Ch. Jan. 5, 2015).

managed firm should be to acquire only those assets which are expected to provide a higher return than the cost of capital used to finance those acquisitions.[50]

As a computational matter in the simplest case, the WACC consists of the sum of the weighted cost of debt and the weighted cost of stockholders' equity. The cost of debt is symbolized by R_d. Its numerical value will be a decimal rate-of-return to the corporation's creditors, usually bondholders. The cost of equity, assumed to consisting exclusively of common stock, is symbolized by R_e. Its numerical value will be a decimal rate-of-return required by the corporation's stockholders.

The weights multiplying each of these costs are the relative proportions of the debt and the equity in the firm's capital structure. This can be described mathematically.

Consider a public corporation with the simplest kind of capital structure; it consists of two-line items on the corporation's financial statements: (1) the *market* value of the company's long-term debt, symbolized by $B plus (2) the *market* value of stockholders' equity, symbolized by $S.[51]

It should be noted that the market values of these two components will seldom be equal to their corresponding values appearing on the firm's balance sheet.

The capital structure of this corporation is defined as V = B + S.[52] The ratio $\frac{B}{V}$ is the percentage of the firm's capital structure represented by the market value of its long-term debt. Analogously, the ratio $\frac{S}{V}$ is the percentage of the firm's capital structure represented by the market value of its equity. It is obvious they must sum to 100%.

Suppose the average effective tax rate applied to corporate taxable income is symbolized by T_c. Under current law, the corporate income tax rate is 21 %.[53] The tax rate is significant because, under the *2017TaxCuts and Jobs Act*, a company can only deduct interest expense of up to 30% of its earnings before interest, taxes, depreciation, and amortization. Any amount of interest expense beyond 30% of EBITDA will no longer be

50. For a thorough and lucid explanation of the WACC prepared for use by practicing professionals (as opposed to academics) see https://www.investopedia.com/terms/w/wacc.asp.

51. This definition of the WACC is based on the presumption that the corporation has not issued preferred stock. If the corporation has issued preferred stock, the definition of the firm's capital structure can be easily modified to consider that issue.

52. STEPHEN ROSS ET AL., ESSENTIALS OF CORPORATE FINANCE 397 (10TH ED. 2020).

53. The United States imposes a tax on the profits of US resident corporations at a rate of 21 percent, reduced from 35 percent. Tax Cuts and Jobs Act, Pub. L. No. 115-97, 131 Stat. 2054 (2017).

deductible. The cost of debt to the issuer should consider the fact that it is reduced by the amount of the interest deduction allowed by law.

The WACC in this simple case is calculated as:[54]

$$WACC = \left(\frac{B}{V}\right) R_d(1 - T_c) + \left(\frac{S}{V}\right) R_e$$

A simple numerical example illustrates the application of the formula. Suppose the company has long-term debt with a market value of $80 million and common stock outstanding with a market value of $240 million. Then the combined market value of the debt and equity (i.e., the capital structure of the firm) is $320 million.

The cost of debt (symbolized by R_d) is the return that the firm's potential creditors will demand on new borrowing by the firm. Unlike a firm's cost of equity, its cost of debt normally can be observed either directly or indirectly because the cost of debt is the interest rate the firm must pay on new borrowing. Suppose it is assumed to be 8%.

Generally, the cost of equity (symbolized by R_e) is defined as the rate of return required by the existing stockholders to compensate them for the risk(s) they assume by holding the firm's common stock. (More on this issue later in the discussion of the CAPM.) Suppose R_e is assumed to be 16%.

Substituting the assumed numerical values of the parameters into the definition, the hypothetical WACC is calculated as:

$$WACC = \left(\frac{\$80}{\$80 + \$240}\right) 8\% \, (1 - .21) + \left(\frac{\$240}{\$80 + \$240}\right) 16\% = 13.58\%$$

In the *Appraisal of Dell, Inc., supra*, where there was no debt, the cost of capital is simply the cost of equity.[55] To determine cost of equity, the Court uses the capital asset pricing model (CAPM).

Expert witnesses have testified about other methods such as a buildup rate model and a risk premium rate model. Then Chancellor Leo Strine explained that concern about the achievability of parts of a company's business plan should be considered by adjustments to the cash flow projections and not by adjusting the discount rate. The buildup model,

54. The algebraic formula for the WACC is ubiquitous in finance and accounting textbooks. It can also be found on many websites. *See* Shobit Seth, *What is the Formula for Weighted Average Cost of Capital (WACC)?*, INVESTOPEDIA (Updated Jan. 17, 2021), https://www.investopedia.com/ask/answers/063014/what-formula-calculating-weighted-average-cost-capital-wacc.asp.

55. *See also* Owen v. Cannon, 2015 Del. Ch. LEXIS 165, 2015 WL 3819204, at *48 (Del. Ch. June 17, 2015); Merlin Partners LP v. AutoInfo, Inc., 2015 Del. Ch. LEXIS 128, 2015 WL 2069417, at *45-46 (Del. Ch. Apr. 30, 2015)

however, may allow for a variety of risks to be poured into the discount rate including so-called projection risk and other factors.[56]

In a relatively recent appraisal proceeding, then Chancellor Strine, who later become Chief Justice of the Delaware Supreme Court, rejected those two methods, and added that the buildup method involves a great deal of subjectivity. It is also at odds with the capital asset pricing model (i.e., the CAPM) because it expressly incorporates a company's specific risk rather than only market risk.

The CAPM has been very thoroughly studied by academics and others for decades. It can be expressed in different ways; in textbooks it is commonly written as an algebraic expression:

$$R_e = \textit{risk-free rate of return} + \beta[\textit{Equity risk premium}]$$

In words, the expected return to stock-holders' equity, symbolized by R_e, is calculated as the sum of two components: the risk-free rate of return + the product of the numerical value of the company's β and the *Equity risk premium*.

Generally speaking, the risk-free rate of return is the rate of return in the market on so-called risk-free fixed-income securities. The "risk" in this context is credit risk, i.e., the risk that the debt issuer will default. As a practical matter, most experts regard the yields on Treasury Bills and Notes (of appropriate maturity) as risk-free in the sense explained above.

Expert witnesses testifying in the Court of Chancery tend to agree, or differ only a little, about the risk-free rate. For example, the experts agreed on 3.9% in Appraisal of Orchard Enterprises, Inc.[57] The experts agreed on 3.31% in *Appraisal of Dell, Inc.*[58] NOTE: Duff & Phelps, Inc. publishes a normalized risk-free rate and equity risk premia.

Experts often disagree widely on the numerical value of the equity risk premium, which is the key to the next component of the CAPM. Most academic textbooks on corporate finance and portfolio management define the equity risk premium to be the excess return required by holders of equity (common stock) over that required by holders of a risk-free asset (such as a U.S. Treasury Bill or Note.)[59]

From a behavioral point of view, the magnitude of the equity risk premium embodies the recognition that investors require an inducement to compensate them for taking positions in risky assets instead of a position in

56. In re Appraisal of the Orchard Enters., 2012 Del. Ch. LEXIS 165, 2012 WL 2923305, at *60-61 (Del. Ch. July 18, 2012).

57. *Id.*

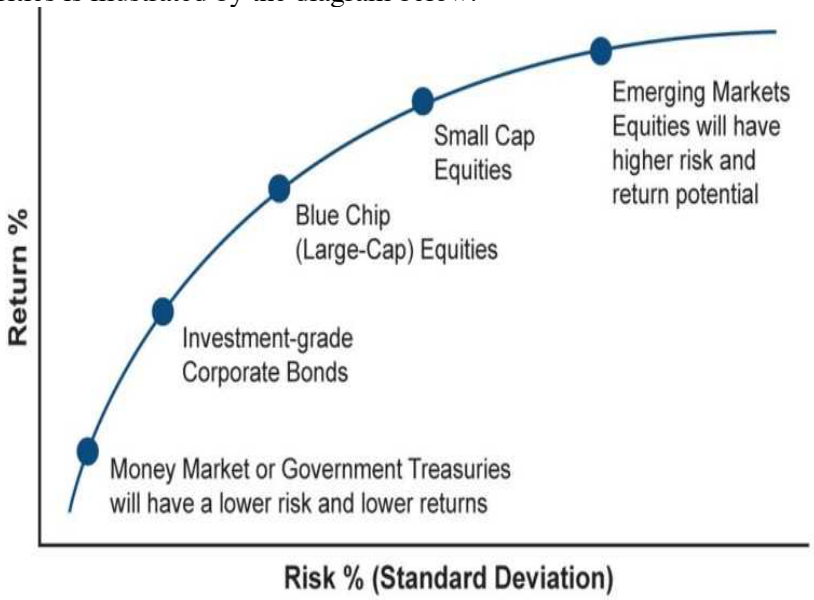
58. In re Appraisal of Dell Inc., C.A. No. 9322-VCL, LEXIS 81 at *160-61 (Del. Ch. May 31, 2016).

59. RAJNISH MEHAR, HANDBOOK OF THE EQUITY RISK PREMIUM (2008).

a riskless asset. It can be construed as the marginal rate of return expected by equity investors to induce them to assume the risks of holding common stocks instead of a T-Bills. The definition can be expressed symbolically as:

Equity risk premium = Expected return to a well-diversified portfolio of common stocks - risk-free rate of return

The relationship between the risk of the rates of return to different kinds of securities and the rate of return expected by investors who hold those securities is illustrated by the diagram below:



The figure above shows the relationship between the rate of return expected by investors on the vertical axis and the riskiness of that return displayed on the horizontal axis. Generally, as the riskiness of a portfolio of securities increases (represented by a rightward movement along the horizontal axis) investors will require an increase in the rate of return they can expect (represented by an upward movement along the vertical axis) to compensate them for the increased risk they bear.

The riskiness ineluctably associated with the rate of return on publicly traded securities can be defined and measured in different ways. One way to think about the risk of return on a portfolio of securities is how dispersed those returns are around the average return on that portfolio. That dispersion around the average is measured by the standard deviation.[60]

60. The mathematical formula applied to calculate the standard deviation of a numerical-valued random variable (such as the randomly distributed returns to a

Experts disagree both on the method and on the data to be used in the determination of the equity risk premium. For years, experts used an historical method, but they changed gradually in recent years to a "supply side" method and used data from the Ibbotson Yearbook to determine the equity risk premium. In 2012, then Chancellor Strine concluded that the academic community had shifted toward greater support for equity risk premium estimates that are closer than the supply side rate published by Ibbotson and that 5.2% was an appropriate metric to be applied in Appraisal of Orchard Enterprises, Inc. A supply side equity risk premium of 6.12% was subsequently used in Appraisal of Dell, Inc.[61]

A sample of equity risk premia adopted by the Delaware Court of Chancery is displayed on the table below.

Sample of the Equity Risk Premia Adopted by the Delaware Chancery Court in Appraisal Matters Since 2010			
Case name	**Decision date**	**Delaware Chancery Court Judge**	**Equity risk premium adopted by the Court**
Global GT LP v Golden Telecom, Inc.	April 23, 2010	Leo Strine	6%
Gearreald v Just Care, Inc.	April 30, 2012	Donald Parsons, Jr.	5.73%
In re Appraisal of The Orchard Enterprises, Inc.	June 18, 2012	Leo Strine	5.2%
IQ Holdings, Inc. v American Commercial Lines, Inc.	March 18, 2013	Travis Laster	5.5%
Merion Capital, LP v 3M Cogent, Inc.	July 8, 2013	Donald Parsons, Jr.	5.2%
Laidler v Hesco Bastion Environmental, Inc.	May 12, 2014	Sam Glasscock	6.14%
In re Rural Metro Corp. Stockholders Litigation	October 10, 2014	Travis Laster	both 6.7% and 6% were considered

portfolio) can be found in any college level textbook on statistics or financial risk. *See* STEPHEN ROSS ET AL., CORPORATE FINANCE 312-13 (12TH ED. 2019).

61. Many textbooks calculate the expected equity risk premium as the difference between two rates if return: (a) the expected rate of the return on diversified portfolio of common stocks, or the return to a proxy of such a portfolio (such as the S&P 500 Index) and (b) the risk-free rate of return.

In re Appraisal of Ancestry.com, Inc.	January 30, 2015	Sam Glasscock	6.11%
In re Appraisal of DFC Global Corp	July 8, 2016	C. Bouchard	6.18%
John Dunmire v Farmers & Merchants Bankcorp	Nov. 10, 2016	C. Bouchard	6.18%
In re Appraisal of SWS Group, Inc.	May 30, 2017	Sam Glasscock	6.21%
Blueblade Capital Opportunities LLC, v. Norcraft	July 27, 2018	Joseph R. Slights	6.21%
In re Appraisal of Consolidated Jarden Corporation	Sept. 16, 2019	Joseph R. Slights	5.03%
Manichean Capital, LLC v Source HOV Holdings	January 30, 2020	Joseph R. Slights	5.97%

This sample of decisions demonstrates that in the last ten years the equity risk premia found by chancellors in diverse cases has ranged between 5.03% and 6.7%. This fact should suggest to practitioners that any equity risk premium grossly exceeding these boundaries is likely to be viewed with skepticism by the Court of Chancery.

The third component of the CAPM is the numerical value imputed to the symbol β. Virtually every publicly traded stock is associated with its own unique numerical value of β. Many investment banks and financial research companies compile and publish estimates of the values of β for listed stocks.[62]

Examination of the algebraic expression of the CAPM shows that the numerical value of β acts as a volatility multiplier for the expected return to stock-holders' equity for specific stocks. This means that the expected return to stock-holders' equity for a specific stock is magnified (or diminished) because the numerical value of the β associated with that stock multiplies the equity risk premium.

Suppose, for example, the value of β for a specific stock is larger than 1. In that example, if the equity risk premium should increase by an arbitrary amount, the expected return to stock-holders' equity in that specific stock will increase by a larger amount. The effect is symmetric; if the equity risk

62. The financial meaning of β for a specific stock is that it measures the systematic relationship (if any) between the variability of the rate of return on that stock and variability of the general public market for stocks. Estimates of β for listed companies are available to any person with internet connectivity. For example, Yahoo finance publishes its estimates of the β for every corporation listed on the NYSE, the AMEX, and the OTC. See https://finance.yahoo.com.

premium should decrease by an arbitrary amount, the expected return to stock-holders' equity in that specific stock will decrease by a larger amount.

Expert witnesses often differ significantly in their derivation of the β volatility multiplier component of the CAPM. When a privately-owned corporation is being valued, the experts look to comparable companies with publicly traded stock to come up with a proxy for the private corporation's β. In an appraisal of a privately owned corporation in 2006, Chancellor Strine discussed comparable companies, which he called the "Core Four", which were the most comparable, and two somewhat less comparable companies, which, when added, he called the "Big Six". The Chancellor used the available evidence to derive four values of β and then calculated their mean to arrive at a β of 1.20.[63]

In 2017 decision, Vice Chancellor Sam Glasscock modified the application of the CAPM by adding a "size premium" to the equation.[64] The Vice Chancellor calculated the expected value of R_e as:

$$R_e = \text{risk-free rate of return} + \beta[\text{Equity risk premium}] + \text{Size premium}$$

The basic rationale of applying a "size premium" is an acknowledgement that, on average, smaller companies achieve higher risk-adjusted returns. In the long run, higher returns are related with higher risk. The additional return of smaller companies is thought to be not fully reflected in the CAPM (i.e., the numerical value of β is underestimated.) To reflect the putative additional risk of smaller companies adequately, the cost of equity derived from the CAPM is "adjusted" with a size premium and perhaps a unique risk premium. In theory, the smaller a company's market capitalization, the higher the size premium. This theory of size premium adjustment is not free from controversy.[65] However, a valuation professional who thinks that a small size premium does not fully reflect the financial risk of a particular company may add a specific company or unique risk premium. That practice has found a skeptical reaction in the courts: "*To judges, the company specific risk premium often seems like the device experts employ to*

63. Andaloro v. PFPC Worldwide, Inc., 2005 Del. Ch. LEXIS 125, 2005 WL 2045640, at *61 (Del. Ch. Aug. 19, 2005).

64. In re Appraisal of SWS Group, C.A. No. 10554-VCG, 2017 WL 2334852 at *17-18 (Del. Ch. May 30, 2017).

65. The scholarly literature on whether and how to apply a size premium is less than enlightening. The same respected scholars have found different results depending on the data set, and others have engaged in vigorous debate about how to interpret the data and what inferences to draw. In re Appraisal of Stillwater Mining Company, C.A. No. 2017-0385-JTL, at *136 (Del. Ch. Aug. 21, 2019).

bring their final results into line with their clients' objectives, when other valuation inputs fail to do the trick."[66]

Discounted Residual (Terminal) Value.

The next, and usually the most significant step monetarily, is to evaluate the discounted residual value (also called "terminal value") which is typically calculated using the perpetual growth model. A critically important foundation to validate the application of the model is the assumption that future cash flows, after the last of them forecasted, has the mathematical property of a constant growth perpetuity. This is frequently referred to by the Delaware courts (and others) as the "*Gordon growth model*."[67] This is a standard and accepted method of measuring terminal value; it assumes that the company's free cash flows will grow at a constant rate in perpetuity.[68] The formula applied in appraisal proceedings looks like this:

$$Discounted\ Residual\ Value = \frac{CF\ in\ the\ last\ year\ projected\ (1 + assumed\ growth\ rate)}{discount\ rate\ -\ assumed\ growth\ rate}$$

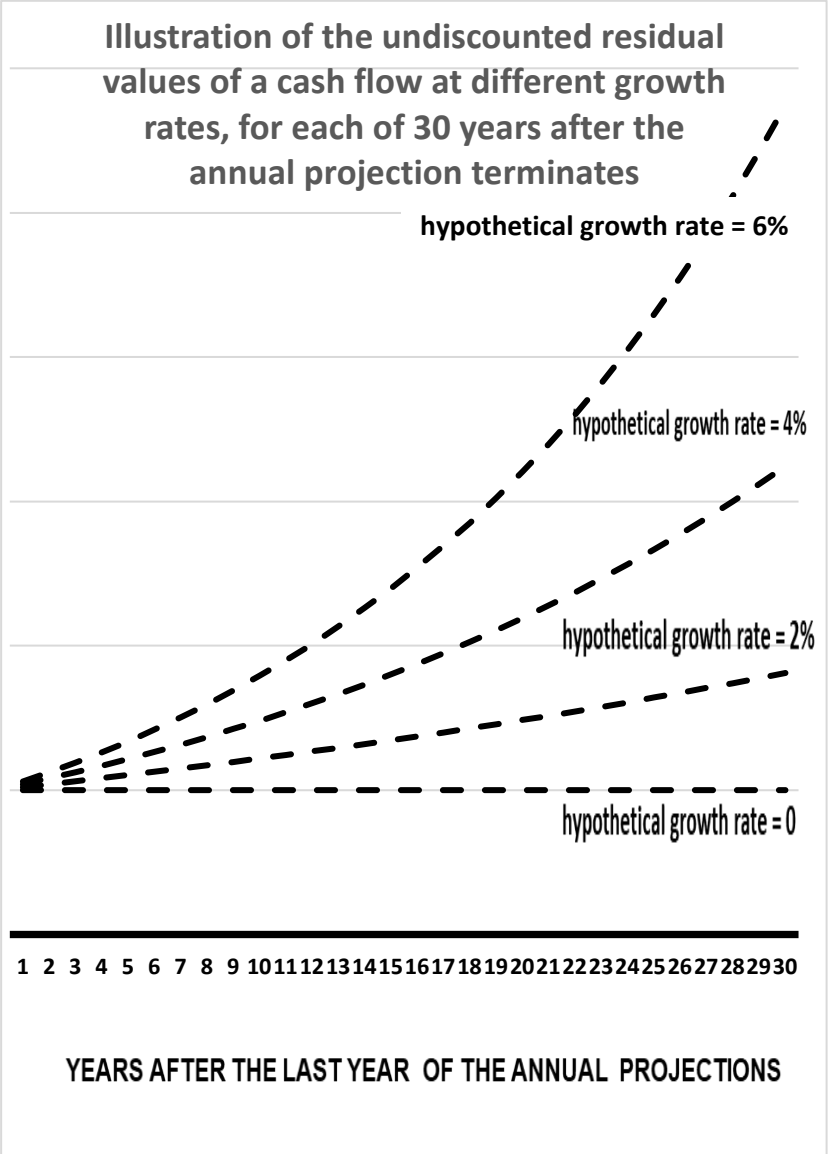
The formula assumes that the financial performance of the company being valued has reached a stable state where it is no longer experiencing the rapid growth achieved by some startup corporations. The premise of the formula is that the company will continue to grow at a reasonable stable average annual rate, referred to in the formula as the *assumed growth rate* That rate is often assumed to be equal to the long-term average annual rate of growth experienced by mature firms in its industry, including whatever portion of that growth is attributable to inflation.

Most of the value calculated by the DCF methods usually comes from the residual value because the formula estimates value in perpetuity. The diagram displayed below illustrates the sensitivity of the undiscounted residual value to different hypothetical growth rates.

66. Del. Open MRI Radiology Assocs., P.A. v. Kessler, 898 A.2d 290, 339 (Del. Ch. 2006).

67. *See* Kendall Hoyd and Silver Spur Capital Partners, LP v. Trussway Holdings, C.A. No. 2017-0260-SG, at *18 (Del. Ch. Feb. 28, 2019); *see also* PAUL ASQUITH & LAWRENCE A. WEISS, LESSONS IN CORPORATE FINANCE 348 (2016).

68. Willian Richard Kruse, individually and as Trustee for the Vivian Calvert Kruse Living Trust and the William Richard Kruse Living Trust, C.A. No. 12392-VCS, at *52 (Del. Ch. Jul. 14, 2020).



The diagram displayed above illustrates how seemingly small changes in the growth rate assumption (e.g., from 2% to 4%) applied to project the undiscounted residual values can have large numerical consequences for valuation of the Discounted Terminal Value.

A recent example of how the Chancellor derived a terminal growth rate appears in a 2017 decision. The Court of Chancery wrote:

> *"[The petitioner's expert] employed a 3% terminal growth rate after performing his recommended adjustments to management projections. [The respondent's expert] set his terminal growth rate slightly higher, at 3.5% which he derived from the midpoint of the long-term expected inflation rate of 2.3% and the long term expected economic growth rate of the economy at large of 4.4%"*

In one appraisal, the Chancellor found that he had made a mathematical error in his DCF calculations and decided to counterbalance the error by increasing the growth rate in his calculation of residual value. On appeal, the Delaware Supreme Court recognized the seriousness of this mistaken adjustment and reversed the decision of the Court of Chancery for that and other reasons.

The Final Piece of a DCF Appraisal. When all is said and done, and the DCF model has been applied with all its refinements; a dollar amount is the result of the DCF calculations. The final step in the appraisal protocol is the determination of the appraisal price per share. That is the price the Court will determine to be the fair value of the shares of dissenting stockholders. This step is mainly a matter of arithmetic. If the DCF is calculated, and the number of shares outstanding in the hands of public investors antedating the merger is symbolized by S, the appraisal share price is calculated as $\frac{DCF}{S}$.

For example, suppose the Court of Chancery finds the DCF to be $12.8 billion. Suppose the number of shares outstanding in the hands of the public is 400 million common. Then the calculation of the appraisal price is $32.00 per share.

V. MARKET VALUE ANALYSIS

The Unaffected Market Price. When a corporation to be acquired by merger has shares traded on a stock exchange, such as the New York Stock Exchange or the NASDAQ, or has shares traded in an Over-the-Counter Market, the trading price in the market are among the "relevant factors" to be considered. This assumes that the shares are not excluded from appraisal under DGCL Section 262 as described earlier.

The trading price on the day when a merger is announced to the public is, of course, affected by the price disclosed in the announcement. Further, history has shown that the trading price tends to rise for some time before a merger announcement as speculators purchase in anticipation of an announcement. Thus, the Court of Chancery may look to average trading prices for a prior period such as 30 or 60 days to obtain a market price unaffected by anticipation of the merger announcement.

In evaluating trading prices, the Court of Chancery considers whether there is an "efficient market" for the shares, meaning a market which provides information promptly and accurately to shareholders and provides modern facilities and services to buy or sell if they want to do so. For example, the Delaware Supreme Court found that the shares of Dell, Inc. had a deep public float; were covered by over 30 analysts; had 145 market makers; and over 5% of its shares changed hands each week. The Court called such characteristics hallmarks of an efficient market and added that Dell's stock price had a track record of reacting to developments concerning the company.[69]

In 2019, the Chancery Court found that the $48.13 unaffected market price of shares of Jarden Corporation was their fair price. The Chancellor pointed to flaws in the other methods presented by the parties, including the deal price of $59.21 per share and the parties' DCF valuation which he described as "fantastically divergent". He found that Jarden's shares were traded in a semi-strong efficient market.[70] He said the stock was traded at the New York Stock Exchange and included in the S&P 400 Index. Its daily and weekly trading volume were in the top 25% of the S&P 500. Its market capitalization uses in the top 20% of all publicly traded firm and the public float was 94%. The bid-asked spread was only .02% and approximately 20 professional market analysts covered and disseminated reports on Jarden.[71]

Comparable Companies And Comparable Transactions. In 2017, Chief Justice Leo Strine of the Delaware Supreme Court wrote a history of business valuation methods that were used in appraisals by the Delaware courts including comparable companies' analysis and comparable transactions analysis.[72] However, comparables analysis had been used less frequently than the DCF method in business appraisal litigation since the Weinberger decision. In his opinion, the Chief Justice went further to say:"

69. Dell, Inc. v. Magnetar Global Event Driven Master Fund Ltd., 177 A.3d 1, 25 (Del. 2017).

70. The definition of a so-called "semi-strong efficient market" can be found in most college level textbooks on corporate finance or portfolio management. A typical statement is that the stock market is efficient with respect to all publicly available information. The concept of "efficiency" in this context means that any new and relevant fact, or any new development, known to the public (or which will be known to the public without significant delay) is reflected immediately in a company's stock price. The logical implication of that proposition is that it is impossible for a portfolio manager to consistently outperform broad-based measures of general market performance (e.g., the S&P 500 Index.) *See generally* STEPHEN ROSS ET AL., CORPORATE FINANCE (12TH ED. 2019). The proposition is disputed by academics as well as financial professionals outside the academy.

71. In re Appraisal of Jarden Corporation, 2019 WL 3244085, at *59 (Del. Ch. July 19, 2019).

72. *See generally* DFC Glob. Corp. v. Muirfield Value P'rs, 172 A.3d 346 (Del. 2017).

> *"Market prices are typically viewed superior to other valuation techniques because, unlike, e.g., a single person's discounted cash flow model, the market price should distill the collective judgment of many based on all the publicly available information about a given company and the value of its shares. Thus, a singular discounted cash flow model is often most helpful when there is not an observable market price."*

Briefly, the first step in comparable company analysis is research to identify, if possible, a peer group of companies with publicly traded shares that have comparable operational and equity characteristics to the company being valued. The next step to calculate key metrics for the companies in the peer group such as market capitalization and enterprise value. The analyst then calculates multiples for the companies in the peer group such as earnings per share, EBITDA per share, and book value per share if the companies are financial companies. The multiples can be historic or preferably future oriented. The numbers of shares should be fully diluted for exercise of stock options and conversion of debentures and preferred stock. These multiples are then compared to those of the company being valued. The comparative results can be divided into percentiles such as 25%, 50% (median), and 75%.

Information available to identify peer group comparable companies, as well as comparable merger and acquisition transactions, can be found in reports to the Securities and Exchange Commission; articles and data in the Wall Street Journal and the Financial Times; articles and data published by accounting firms, investment banking firms and law firms; and on-line publications such as Fact Set, Bloomberg (Supply Chain), S&P Capital IQ, and Pitch Book.

The burden of proof of comparability rests on the party seeking to use a comparable method. The Court of Chancery has said: *"The selected companies need not be a perfect match; however, to be useful the methodology must employ "a good sample of actual comparables."*

The Court of Chancery went on to find in *Orchard Enterprises* that the companies selected by an expert witness were not truly comparable.[73]

When the appraisal of DFC Global was decided on appeal in 2017, the Delaware Supreme Court said as follows:

> *"Although the petitioners' expert argued that none of the comparable companies had a mix of business and geographic locations that were sufficiently similar to DFC, there was ample evidence in the record to support the Chancellor's decision that the six comparable companies*

73. In re Appraisal of the Orchard Enters., 2012 Del. Ch. LEXIS 165, 2012 WL 2923305, at *83 (Del. Ch. July 18, 2012).

> *both experts used were, in fact, sufficiently comparable for this analysis."*

The Supreme Court went on to indicate that a "market check" could have been used to evaluate the reliability of DCF analysis but concluded that the deal price was the most reliable indication of fair value of DFC Global's shares. Thus, comparable companies' analysis was not used as the method which actually determined fair value.[74]

Chancellor Joseph Slights recently devoted ten pages to discussion of comparable companies' methodology in his appraisal of Jarden Corporation. However, he finally agreed with the testimony of the respondent's expert that Jarden had no comparable peers. He gave the testimony on comparable companies no weight and concluded that the fair value was the unaffected market price of Jarden's shares.[75] Thus, the comparable companies' method continues to be seldom successfully used to determine a fair price in strongly contested appraisal cases.

The Delaware Supreme Court affirmed the decision of the Chancery Court, after finding, among other things, that the DCF valuations by experts were wildly divergent.[76] The Supreme Court held the unaffected market price was satisfactory.[77]

VI. THE "DEAL PRICE"

In several appraisals in recent years, the Court of Chancery declined prices determined by the DCF method and other valuation methods and found that the "deal price" in the merger agreement was the fair price. Flaws in the application of other business valuation methods contributed to those decisions. However, the Court of Chancery and the Supreme Court adopted the "deal price" when they found that the deal had been negotiated and determined by procedures which demonstrated that it was "fair value" to the dissenting shareholders. To describe those procedures, it is necessary to review some history briefly.

The courts in Delaware have traditionally applied a standard called the "business judgment rule" to evaluate management proposal or conduct challenged it lawsuits by shareholders. However, when the management conduct involves a conflict of interest, the Delaware courts have applied a stricter standard called the "entire fairness" rule. Under the business judgment rule, the shareholders have the burden of proof. Under the entire

74. *DFC*, 172 A.3d at 369.
75. In re Appraisal of Jarden Corporation, 2019 WL 3244085, at *29.
76. Fir Tree Value Master Fund v. Jarden Corp., 236 A.3d 313, 315 (Del. 2020).
77. *Id.*

fairness standard, management has the burden of proof of the fairness of every aspect of a challenged transaction. An example of a merger involving a conflict of interest is a "force out" merger of minority shareholders by controlling shareholders.[78]

The Delaware Supreme Court held decades ago that management of a corporation being sold has auction like duties to obtain the best price for its shareholders.[79] In response, managements developed several steps that they could take to show that they were fulfilling the auction duties. The Delaware Supreme Court subsequently clarified that there is really one obligation which is to take reasonable steps to get the best price for the shareholders. The Delaware Supreme Court declined to order specific steps or to identify how to achieve the goal, but left managements free to plan and negotiate in good faith how to fulfill their "Revlon duties."[80] A list of some of the steps which may be taken is as follows:

1. Appointment of a committee of independent directors with its own legal counsel, financial advisers, and authority to negotiate the merger price and other terms.

2. Obtaining a "fairness" opinion from an independent and expert business valuation firm such as Evercore, Inc. or Duff & Phelps Corporation.

3. Conducting an initial "market check" to identify and commence discussions with potential buyers including, if available, strategic and financial bidders.

4. Cooperating with "due diligence" reviews by potential bidders and making key personnel and documents available pursuant to reasonable confidentiality agreements.

5. Negotiating with bidders for higher prices.

6. Negotiating contract terms that enable fulfillment of their fiduciary obligators including "go shop" provisions and no more than a reasonable "breakup fee."

7. Performing the "go shop" campaign effectively.

8. Arranging with a controlling shareholder or shareholders, if any, to cooperate reasonably with the auction process and to refrain from seeking to negotiate conflicting terms with potential bidders.

9. Fulfillment of disclosure obligations to enable the securities market to operate efficiently.

In recent years, the number of companies that have well performed the auction duties appears to have grown and improved the prices paid to

78. Weinberger v. UOP, Inc., Del. Ch., 426 A.2d 1333, 1345 (1981), rev'd on other grounds, Del. Supr., 457 A.2d 701 (1983); *see also generally* Smith v. Van Gorkom, 488 A.2d 858 (Del. 1985) (applying enhanced scrutiny though a conflict of interest was not involved).

79. Revlon, Inc. v. MacAndrews & Forbes Holdings, Inc., 506 A.2d 173, 179 (1986).

80. Lyondell Chem. Co. v. Ryan, 970 A.2d 235, 241 (Del. 2009).

shareholders in merger transactions. On the other hand, the Delaware Court of Chancery and the Delaware Supreme Court have been increasingly critical of the testimony presented by some experts in support of DCF valuations, especially of extremely optimistic or erroneous projections of cash flows by experts. The result has been several appraisal decisions which rejected DCF valuations and concluded that the deal price was the fair price.

In August 2017, the Delaware Supreme Court reversed a decision of the Chancery Court involving an appraisal of the shares of DFC Global Corporation, an international payday loan firm, which had determined not to give more than one-third weight to the deal price. The Court of Chancery had given weight to comparable company analysis which the Supreme Court found was within the Chancellor's discretion. The Supreme Court found the DCF valuation adopted by the Chancellor was erroneous in its determination of perpetuity growth rate and in other ways. The Supreme Court ordered the Chancellor to reassess the weights and said that the relevant factors suggested that the deal price was the most reliable indication of fair value.[81]

In December 2017, the Delaware Supreme Court again reversed a decision by the Court of Chancery which had appraised the shares of Dell, Inc. at a fair value of $17.62 per share. The Supreme Court commented early in its opinion that the $17.62 amount was far more than the deal price of $13.75 per share which was already a 37% premium to the ninety-day average unaffected stock price. The Chancellor and the Supreme Court agreed that the petitioners' DCF analysis lacked credibility on its face. The Supreme Court held that the Chancellor had then relied exclusively on his own DCF analysis which was based on several erroneous assumptions and arrived at a value nearly $7 billion above the transaction price. The Supreme Court described the procedures used to negotiate the sale of Dell, Inc. including cooperation with extensive due diligence reviews by potential buyers (which were primarily private equity firms) as well as negotiation of bid price increases, "Go Shop" activities, and agreements by Michael Dell to cooperate with any of the potential bidders. In ordering that the Chancellor reconsider, the Delaware Supreme Court described several factors which it said suggested strong reliance on the deal price and far less weight, if any, on the DCF analysis.[82]

In 2017, the Delaware Supreme Court reversed another appraisal decision by the Court of Chancery of the fair value of shares of Aruba Networks, Inc., a company engaged in wired, wireless and security networking solutions. The Court of Chancery had decided that the fair value of Aruba's shares was their 30-day average unaffected market price of

81. DFC Global Corp. v. Muirfield Value Partners, 172 A.3d 346, 351 (Del. 2017).

82. Dell, Inc. v. Magnetar Global Event Driven Master Fund Ltd., 177 A.3d 1, 46-47 (Del. 2017).

$17.13 per share traded on the New York Stock Exchange. However, in April 2019 the Delaware Supreme Court held that the fair value was $19.10 which reflected the deal price minus a portion of synergies left with sellers. The Supreme Court said that the $19.10 deal price was corroborated by the buyer, Hewlett Packard, and Aruba and by Aruba's DCF, comparable companies, and comparable transactions analysis.[83]

The Supreme Court decision in the *Aruba* case appears to us to be more than an ordinary reversal. It was critical of the Chancellor on several issues and found that there was lack of support in the record for his findings. The Supreme Court took the unusual step of deciding on the fair value of $19.10 instead of its usual practice of remanding the case back to the Chancellor.

In its *en Banc* opinion, the Supreme Court expatiated on the economic theory of how "agency costs" can factor into the determination of fair value. The Court wrote:

> *"Applying the going-concern standard, we hold that the Court of Chancery abused its discretion in using Aruba's 'unaffected market price' because it did so on the inapt theory that it needed to make an additional deduction from the deal price for unspecified 'agency costs'. . . Indeed, neither party presented any evidence to suggest that any part of the deal price paid by HP, a strategic buyer, involved the potential for agency cost reductions that were not already captured by its synergies estimate. Synergies do not just involve the benefits when, for example, two symbiotic product lines[84] can be sold together. They also classically involve cost reductions that arise because, for example, a strategic buyer can produce the same or greater profits with fewer employees. . . Private equity firms often expect to improve performance and squeeze costs too, including by reducing 'agency costs.'* "[85]

In 2018, the Court of Chancery determined that the fair price of the shares of Solera Holdings, Inc. (an international leader in data and software for automotive, homeowners and identity management) was the deal price less estimated synergies, i.e., $53.53 per share. In reaching that conclusion,

83. Verition P'rs Master Fund Ltd. v. Aruba Networks, Inc., 210 A.3d 128, 131 (Del. 2019).

84. "Symbiotic" product lines are defined by economists as complementary goods and/or services.

85. In re Appraisal of Solera Holdings, Inc., 2018 Del. Ch. LEXIS 256, 2018 WL 3625644, at *39 (Del. Ch. July 30, 2018); *see also* ROBERT W. HOLTHAUSEN & MARK E. ZMIJEWSKI, CORPORATE VALUATION: THEORY, EVIDENCE AND PRACTICE 681 (2ND ED. 2014).

the Court of Chancery rejected petitioners' claim based on a "fairly unbelievable" DCF analysis that the fair value was $84.65 per share. The Court of Chancery also rejected a belated claim by the petitioners that the fair value was the unaffected market price of $36.39 per share. In support of its valuation, the Court of Chancery described in detail the sale process conducted, among other things, by a special committee of independent directors and included a 28 day "Go Shop" project. The Chancellor also explained that Solera's shares were traded at the New York Stock Exchange in an "efficient market."[86]

Repeated rejections in appraisal proceedings of expert testimony based on the DCF method using unrealistic cash flow projections and other overoptimistic assumptions have increased the risk of appraisal arbitrage.

In a related lawsuit, Solera Holdings, Inc. obtained a decision from the Delaware Superior Court that it is entitled to recover its defense costs and prejudgment interest from its directors and officers (D&O) liability insurer.[87] The Superior Court held that Solera's expenses were a "violation" and, thus, a "Securities Claim" within the language of the insurer's D&O policy.[88] Decisions by the Delaware Superior Court may be appealed to the Delaware Supreme Court.

During 2020, The Chancery Court again, adopted the deal price as fair value in Appraisal of Panera Bread Co.[89] After negotiating price increases, the deal price reached $315 per share. Finding that "Go shop" efforts were unlikely to produce a higher price. The Chancery Court found that deal price minus synergies totaling $11.56 were a fair value of $303.44 per share. In fact, no competitive bidder appeared after the deal was signed.[90]

The dissenting shareholders contended that synergies should not have been subtracted and Panera's parent, SAB Holdings, claimed it was entitled to a refund of its amount paid for those synergies. However, the Chancery Court denied both claims.[91]

VII. APPRAISAL ARBITRAGE

Before closing this article, a few comments should be made on the subject of "appraisal arbitrage." To put it simply, appraisal arbitrage

86. In re Appraisal of Solera Holdings, Inc., 2018 Del. Ch. LEXIS 256, 2018 WL 3625644, at *61-62 (Del. Ch. July 30, 2018).

87. Solera Holdings, Inc. v. XL Specialty Ins. Co., 213 A.3d 1249, 1259 (Del. Super. Ct. 2019).

88. *Id*.

89. In Re Appraisal of Panera Bread Company, C.A. No. 2017-0593-MTZ, (Del. Ch. Jan. 31, 2020).

90. *Id*.

91. *Id*.

signifies a situation where venture firms buy target-company shares shortly after a deal's announcement. They execute those trades principally (if not solely) to seek a judicial appraisal resulting in a judicially ordered increase of the share price paid to those venture capitalists as well as other dissenting shareholders. A 2007 opinion in *In re Appraisal of Transkaryotic Inc*. opened the door for appraisal arbitrage, and the data show that this strategy has become more prevalent over time.[92]

Those "dissenting" investors finance the extensive costs of the appraisal proceedings through venture capital funds, which take the necessary procedural steps to bring appraisal proceedings. These petitioners seek in the appraisal proceedings to recover a fair value of their shares, plus interest and costs that is higher than the price they paid for the shares.[93] As mentioned above, there is no requirement that they owned their shares before the merger was announced.

The post-announcement purchasers petitioning for an appraisal assume a binary risk that can be described this way:

The risk that the appraisal proceedings will result in a significantly higher fair value than the deal price.

The complementary risk is that the proceedings will result in a fair value lower than the deal price.

In a risk (a), the appraisal arbitrageurs will earn a positive return only if the premium found by the court (if any) exceeds their litigation-related costs of the appraisal. In risk (b) the arbitrageurs may sustain a significant loss if fair value is found to be less than the sum of their purchase price and their litigation costs. Note that these are the same risks assumed by any dissenting shareholder.[94] The risk described is eased to some extent by rewards of interest compounded quarterly at a rate 5% above the Federal Reserve's discount rate.

There is an ongoing debate regarding the extent to which increased appraisal litigation in the Delaware Chancery Court is beneficial from a public policy perspective.

Appraisal arbitrage cases can be lengthy. In a 2020 publication Professor Jiang and his co-authors found that while the time from the effective date of a merger to the filing of the first appraisal petition averages 73 days, the time to resolution is much longer. For example, the average time

92. DAVID MARCUS & FRANK SCHNEIDER, CORNERSTONE RESEARCH, APPRAISAL LITIGATION IN DELAWARE: TRENDS IN PETITIONS AND OPINIONS 2006-2018 (2019).

93. In response to the growing practice of appraisal arbitrage, in 2016 Delaware's General Assembly amended the state's appraisal statute, Section 262 of the Delaware General Corporation Law. The amendment to Section 262(h) granted corporations the option to "prepay" appraisal claimants an amount of the corporation's choosing in order to stop the accrual of interest. *See* 8 Del. C. § 262.

94. Salomon Brothers Inc. v. Interstate Bakeries Corp., 576 A.2d 650, 652 (Del. Ch. 1989); appeal refused, 571 A.2d 787, 1990 WL 18152 (Del. 1990).

to reach settlement after the first petition is filed is 406 days and if there is a court decision the time from filing to that decision is on average 2.6 years.[95] Importantly, during these long intervals pre-judgment interest, set at five percentage points above the risk-free rate, constitutes a significant part of the returns to appraisal arbitrageurs.

There are some gross statistical findings that help to assess the magnitude of the binary risk of appraisal arbitrage. Between year 2006 and year 2018, there was an almost even split between the rulings in which fair value was determined to be above the deal price and rulings in which fair[96] value was determined to be at or below the deal price. Moreover, there is a substantial variation in the premia awarded. Of the 34 cases decided by the Chancery Court and the Delaware Supreme Court between 2008 and 2018, the average premium was 18 percent above the deal price. For the 16 cases in which a positive premium was awarded, the average premium was 47 percent.

Unlike many small shareholders, venture capital funds have generally had experience and resources to hire skilled legal counsel and to interview qualified and prestigious expert business valuation wit nesses who are optimistic about the business of the corporation acquired in a merger. For some decades after the decision in *Weinberger v. UOP, Inc.*, appraisal arbitrage was often successful, especially when respondent corporate parties to a merger did not seek (or put to use) expert business valuation advice or failed to fulfill Revlon duties. As time has passed, however, corporate merger parties have become more willing, when possible, to obtain early and put to use expert legal and business valuation advice during planning and then in appraisal proceedings. In court, expert testimony has been challenged when perceived to be overoptimistic or incorrect. As the reader has seen, there have been a number of appraisal proceedings where fair value was found to be the deal price or even lower than the deal price.

In 2017, the Delaware Supreme Court decided the *DFC Global* and *Dell* cases, sending a clear message that in the future the lower court should rely more heavily on the deal price, especially in arms-length deals, in assessing valuation. This philosophy was reinforced by a 2019 Delaware Supreme Court opinion in *Aruba Networks*. The research by Jiang, et. al cited above found that those cases led to lower returns from appraisal arbitrage, mostly by significantly reducing valuation improvement from appraisals. These results increase the risk of appraisal arbitrage, but also appear to benefit

95. Jiang, Wei and Li, Tao and Thomas, Randall S., *The Long Rise and Quick Fall of Appraisal Arbitrage* (February 28, 2020). Vanderbilt Law Research Paper No. 20-16, Available at SSRN: https://ssrn.com/abstract=3546281 or http://dx.doi.org/10.2139/ssrn.3546281.

96. MARCUS, *supra* note 92.

shareholders as a whole by providing higher deal prices.[97] A paper published in 2019 contributes to this discussion.[98] The authors of that paper find, among other things, that compared to deals without appraisal challenges, deals subject to appraisal challenges have, on average, a 6% lower post-announcement arbitrage spread. Based on this observed gap, the authors claim that appraisal challenges benefit target shareholders by narrowing arbitrage spreads. In particular, they state that:

"*[t]he narrower spread provides preexisting investors in such firms the option to receive approximately 6 percent more value if they decide to sell prior to closing (insuring against the risk of deal failure). Passive investors have the opportunity to share in some of the gains from merger arbitrage*."

97. Several commentators have decried appraisal arbitrage as imposing avoidable risks and costs on deal certainty and pricing. Those commentators argue that appraisal arbitrage reduces/destroys target shareholder value. A research paper, dated December 2017, (applying what one might call "high tech" mathematics and econometrics) found that the appraisal-liberalizing events of 2007 were associated with a significant increase in deal premia, as the enhanced credibility of appraisal implicitly raised the de facto "reserve price" associated M7A auctions. The authors of the paper found little evidence to suggest that liberalized appraisal stifled the availability of appraisal eligible deals. All told, the nature and context these shocks suggest that target-company shareholders likely benefitted ex ante from liberalized judicial policies related to appraisal. Callahan, Scott, Darius Palia and Eric Talley. 2018. Appraisal Arbitrage and Shareholder Value. Journal of Law, Finance, and Accounting 3(1): 147-188.

98. Boone, Audra, Brian Broughman and Antonio J. Macias. 2019. *Merger Negotiations in the Shadow of Judicial Appraisal*. 62(2) THE J. OF L. & ECON., 281 (2019).