BANKRUPTCY AVANT-GARDE

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ABSTRACT

In Bankruptcy Fire Sales, *Professors Lynn M. LoPucki and Joseph W. Doherty purported to show that going-concern sales generally recover less than half the value that could be recovered through reorganization, even after controlling for pre-bankruptcy book-asset value and other factors. Professor James J. White disputed those findings in* Bankruptcy Noir. *White argued,* inter alia*, that the firms sold as going-concerns entered bankruptcy in worse condition than reorganized firms for reasons not reflected in accounting measures. LoPucki and Doherty responded to White in* Bankruptcy Vérité*, observing that White had failed to produce a credible measure of pre-bankruptcy firm value with which to substantiate his claims. Consequently, the debate concerning bankruptcy recoveries in going-concern sales and reorganizations is at a stalemate for want of a credible measure of pre-bankruptcy firm value. This Article uses an options-pricing model to calculate market-based pre-bankruptcy valuations of the firms in LoPucki and Doherty's dataset. The valuation calculated from the options-pricing model more accurately predicts bankruptcy recovery than book-asset value. Comparing the valuations calculated from the options-pricing model with book-asset values substantiates White's claim that firms sold as going-concerns enter bankruptcy in worse condition than firms that reorganize. When bankruptcy recoveries are measured as proportions of the pre-bankruptcy values calculated from the options model, the difference in average recovery ratios identified by LoPucki and Doherty narrows and its statistical significance becomes marginal. Last, this Article identifies an unresolved methodological bias in the measurement of bankruptcy recoveries, which results from differences between the recognition of liabilities in asset purchase agreements (from which recoveries in going-concern sales are computed) and the recognition of liabilities in fresh-start financial statements (from which recoveries in reorganizations are computed). This measurement bias may explain any remaining difference between recoveries in going-concern sales and reorganizations.*

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INTRODUCTION

Chapter 11 allows financially imperiled firms to survive as going-concerns by reorganizing their capital structures in court-supervised plans.[1] The traditional justification for the existence of reorganization is that it preserves value that would be lost by selling the assets of distressed firms for scrap in the market.[2]

As markets for distressed assets have matured, that rationale has appeared increasingly anachronistic to law-and-economics scholars.[3] In their provocatively titled article, *The End of Bankruptcy*, Douglas Baird and Robert Rasmussen posited

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[1] *See* 3 COLLIER ON BANKRUPTCY, ¶ 1100.01, at 1100-4 (Alan N. Resnick & Henry J. Sommer eds., 16th ed. 2010) (explaining purpose of chapter 11 is to allow debtor to reorganize business and financial affairs or to sell as going-concern rather than just liquidating).

[2] *See* U.S. v. Whiting Pools, Inc., 462 U.S. 198, 203 (1983) ("In proceedings under the reorganization provisions of the Bankruptcy Code, a troubled enterprise may be restructured to enable it to operate successfully in the future . . . . Congress presumed that the assets of the debtor would be more valuable if used in a rehabilitated business than if 'sold for scrap.'").

[3] *See, e.g.*, THOMAS H. JACKSON, THE LOGIC AND LIMITS OF BANKRUPTCY LAW 223 (Beard Books ed. 1986) (arguing as alternative to reorganization, firms could be sold under chapter 7 in same way companies initially go public); Douglas G. Baird, *The Uneasy Case for Corporate Reorganizations*, 15 J. LEGAL STUD. 127, 140–41 (1986) (explaining in efficient market, market participants will bid value of debtor's assets when put to their best use); Michael C. Jensen, *Corporate Control and the Politics of Finance*, 4 J. APPLIED CORP. FIN. 13, 31–32 (1991) (positing reorganizations should be replaced by mandatory auctions). *See generally* Michael Bradley & Michael Rosenzweig, *The Untenable Case for Chapter 11*, 101 YALE L.J. 1043, 1051 (1992) (articulating reorganization entrenches management to detriment of other stakeholders and should be replaced by market mechanism).

that in modern financial markets, where large companies can be acquired as going-concerns even during bankruptcy, nothing is preserved by reapportioning a company's future cash flows among existing creditors that could not also be preserved by selling the company to new owners at a price determined by the market.[4] For a while, at least, the trend in bankruptcy practice seemed to support that view. From 1988 to 2004, the percentage of large public company chapter 11 cases that culminated in a sale of substantially all assets rose from 0% to over 50%.[5] The same scholars who first characterized reorganization as a vestige of inchoate financial markets interpreted the sharp rise in chapter 11 sales as an empirical affirmation of their faith in the market for bankrupt companies.[6]

But just when law-and-economics scholars began boarding the floats for their victory parade, along came two incorrigible rain clouds named Lynn LoPucki and Joseph Doherty.[7] In *Bankruptcy Fire Sales*, LoPucki and Doherty presented the first rigorous comparison of bankruptcy recoveries in reorganizations and going-concern sales.[8] Specifically, LoPucki and Doherty compared recoveries attained in twenty-four chapter 11 cases that completed reorganization between 2000 and 2004 with recoveries attained in twenty-five chapter 11 cases that ended in the sale of substantially all assets under section 363 sales during the same period.[9] The comparison took the form of a multifactor regression analysis in which the independent variable of interest was disposition type (sale or reorganization) and the dependent variable was the "recovery ratio," which LoPucki and Doherty

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[4] Douglas G. Baird & Robert K. Rasmussen, *The End of Bankruptcy*, 55 STAN. L. REV. 751, 789 (2002) ("The days when reorganization law promised substantial benefits are gone.").

[5] *See* Lynn M. LoPucki & Joseph W. Doherty, *Bankruptcy Fire Sales*, 106 MICH. L. REV. 1, 43 fig.1 (2007) [hereinafter LoPucki & Doherty, *Fire Sales*] (illustrating rise in amount of liquidations of public companies).

[6] *See* Douglas G. Baird & Robert K. Rasmussen, *Chapter 11 at Twilight*, 56 STAN. L. REV. 673, 675, 679 (2003) (citation omitted) ("[W]hatever value exists is usually best preserved through a sale . . . . The large Chapter 11s of 2002 confirm our claim in *The End of Bankruptcy* that going-concern sales and implementation of prenegotiated deals now dominate the scene."); *see also* Douglas G. Baird, *The New Face of Chapter 11*, 12 AM. BANKR. INST. L. REV. 69, 71 (2004) ("Instead of providing a substitute for a market sale, chapter 11 now serves as the forum where such sales are conducted.").

[7] LoPucki and Doherty have earned a reputation for questioning the efficiency and even legality of various aspects of the bankruptcy system. *See* Lynn M. LoPucki & Joseph W. Doherty, *Routine Illegality in Bankruptcy Court, Big-Case Fee Practices*, 83 AM. BANKR. L. J. 423, 423 (2009) (arguing bankruptcy courts violate Bankruptcy Code by allowing professional fee practices); *see also* Lynn M. LoPucki & Joseph W. Doherty, *Professional Overcharging in Large Bankruptcy Reorganization Cases*, 5 J. EMPIRICAL LEGAL STUD. 983, 983–84 (2008) (analyzing professional fees and expenses in bankruptcies of large companies and finding large companies are overcharged); Lynn M. LoPucki & Joseph W. Doherty, *Why are Delaware and New York Bankruptcy Reorganizations Failing?*, 55 VAND. L. REV. 1933, 1936–37 (2002) (criticizing New York and Delaware for high failure post-reorganization in bankruptcy proceedings).

[8] LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 3–5 (comparing reorganization to selling and finding reorganization preserves more value).

[9] *Id.* at 15–18 (describing sample selected for study). Although LoPucki and Doherty initially collected data on thirty reorganizations and thirty section 363 sales, their core analysis excluded five piecemeal sales, one sale that arose out of fraud, and five reorganizations lacking post-bankruptcy equity market values. *Id.* at 16, 23 tbl.1, 48 app. A-2 (excluding piecemeal sales because scholars believe such sales receive prices lower than reorganization).

defined as the ratio of a debtor's bankruptcy recovery to the book value of its assets immediately prior to bankruptcy.[10]

Following that methodology, LoPucki and Doherty arrived at results overwhelmingly adverse to the hypothesis that going-concern sales preserve as much value as reorganizations. In particular, LoPucki and Doherty found that even after controlling for firms' earnings in the year prior to bankruptcy, reorganized firms recovered about 75% of their pre-filing book-asset values on average, while firms sold under section 363 recovered about 29%.[11]

LoPucki and Doherty proposed an incendiary interpretation of their results. They opined that firms sold under section 363 could have recovered over twice as much value by completing reorganization, but were nevertheless sold to advance the interests of corporate managers, investment bankers, and bankruptcy judges.[12] If LoPucki and Doherty are right, then between 2000 and 2004, the bankruptcy system bilked about $74 billion from claimants by confirming section 363 sales.[13] To put that amount in perspective, the graft for which Bernie Madoff was sentenced to 150 years in prison totaled $19 billion.[14]

So far, the only skeptic of LoPucki and Doherty's eye-popping conclusion to roll up his sleeves and dig into their numbers is commercial-law scholar James White.[15] In *Bankruptcy Noir*, White confronted LoPucki and Doherty on two grounds.[16] First, White showed that if the values of all firms entering bankruptcy and the values of reorganized firms exiting bankruptcy were measured using what investment bankers call total enterprise value ("TEV"), there would be no statistically significant difference between the recovery ratios of firms sold under section 363 and firms that completed reorganization.[17] Second, White claimed that even if his application of TEV were deemed erroneous, LoPucki and Doherty's findings could not be trusted because their analysis suffered from selection bias—

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[10] *Id.* at 22–25 (discussing regression model used in study).

[11] *Id.* at 24 (explaining whether company is reorganized or sold affects recovery ratios).

[12] *Id.* at 31–37, 44–45 (proposing companies prefer to sell rather than reorganize even though reorganizations yield more value).

[13] There were forty-nine confirmed section 363 sales between 2000 and 2004 with aggregate book assets of $160 billion (in current dollars). *See* Lynn M. LoPucki, BANKRUPTCY RESEARCH DATABASE, http://lopucki.law.ucla.edu (last visited Mar. 30, 2011). If LoPucki and Doherty are correct that, in general, these firms were sold to recover 29% of their book-asset values when they could have been reorganized to recover around 75% of their book-asset values, then total recoveries of firms sold under section 363 during the period were $46 billion when they could have been $120 billion, which is a loss of $74 billion for bankruptcy claimants. *See* LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 24 (citation omitted) ("Controlling for the company's earnings, reorganized companies recover about 75% of their book value, compared to a 29% recovery ratio for those that sell.").

[14] *See* Dionne Searcey, *Bernie Madoff, the $19 Billion Con, Makes New Friends Behind Bars*, WALL ST. J., Dec. 15, 2009, at A33 (articulating Madoff's victims lost $19 billion in largest Ponzi scheme in history).

[15] *See generally* James J. White, *Bankruptcy Noir*, 106 MICH. L. REV. 691 (2008).

[16] *Id.* at 692 (emphasizing "LoPucki and Doherty's enterprise numbers overstate the value that goes to the reorganized companies' creditors" and "there is a selection error in the samples").

[17] *Id.* at 699 (finding after using TEV as starting value, reorganized firms returned 70% of entering value and section 363 sales firms delivered 64%).

namely, the firms that were sold in the dataset were weaker from the outset of bankruptcy than those that were reorganized.[18]

Though pregnant with merit, White's arguments fell flat due to defects in his research design. The most glaring of these defects was White's calculation of each firm's pre-bankruptcy TEV as the sum of its equity market value and the *face value* of its debts.[19] The trouble with this approach is best articulated by White himself:

> [I]t would have been best to use market value of debt (rather than face value) to measure the TEV of all of the firms on their entrance into Chapter 11. That is because much of that debt would have an actual value substantially less than its face value in anticipation of the firm's default on that debt.[20]

As observed by LoPucki and Doherty in *Bankruptcy Vérité*, White's method of valuing firms based on notional debts may have fabricated billions of dollars of nonexistent assets in many cases.[21] Such an enormous distortion when measuring pre-bankruptcy firm values could drown out the statistical significance of disposition type when determining recovery ratios because it floods the data with noise.[22]

White's inability to credibly measure pre-bankruptcy firm value also stymied his allegation of selection bias. White contended that the firms sold under section 363 entered bankruptcy worth less than their reorganized counterparts for reasons not reflected in book assets and earnings (factors for which LoPucki and Doherty controlled).[23] To his credit, White presented convincing evidence that many of the section 363 firms entered bankruptcy in shambles.[24] He also suggested a plausible reason why accounting measures such as book assets and earnings might fail to capture the weakness of the section 363 firms. According to White, these firms were hemorrhaging value faster than their accountants could quantify the losses and write-down the assets.[25] Still, there was a gaping hole in White's argument. White never even attempted to rigorously demonstrate that the firms sold under section 363 were worth less (as a percentage of their book assets) than their reorganized

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[18] *Id.* at 702 (stating section "363 sales do not cause low value, but low value might cause 363 sales").

[19] *Id.* at 695 (calculating TEV by "totaling the market value of the current owners' interest").

[20] *Id.* at 695 n.11.

[21] Lynn M. LoPucki & Joseph W. Doherty, *Bankruptcy Vérité*, 106 MICH. L. REV. 721, 725–27 (2008) (criticizing White's methodology and indicating such methodology caused "phantom assets" of billions of non-existent dollars).

[22] *See id.* at 727 (arguing other methods for valuing companies at filing would have been more appropriate and White's method distorts data findings).

[23] White, *supra* note 15, at 702 ("Section 363 sales do not cause low value, but low value might cause 363 sales. Put another way, the firms that find their way into 363 sales are weaker from the outset and that difference, not the process, explains lower returns.").

[24] *Id.* at 702–04 (discussing financial failures of telecommunications firms entering section 363 sales).

[25] *Id.* at 704 ("[O]ne might argue that the fact that Messrs. LoPucki and Doherty could not find reliable published financial data on seven of the sale firms within the year before their filing shows that these firms were failing so rapidly that their accountants could not keep up.").

counterparts going into bankruptcy,[26] presumably because he lacked a credible measure of pre-bankruptcy firm value. As such, White's allegation of selection bias never moved beyond conjecture informed by one-sided anecdotes and his own experience.

What the debate sorely needs is a market-based valuation of each firm's assets prior to bankruptcy. Of course, if market prices were available for every component of every firm's capital structure, the market value of each firm's assets before bankruptcy could be determined from basic arithmetic; the Modigliani-Miller theorem holds that the value of a firm's assets must equal the total value of claims to those assets.[27] When only pre-bankruptcy equity prices are available, as is the situation here, determining the value of the firm's total assets is more difficult, but it is not impossible.

Financial economists view a firm's equity as a call option on the firm's total assets, which can be exercised by paying the firm's obligations when they come due.[28] Options-Pricing Theory teaches that the value of an option can be derived from the value of the assets underlying it, or vice versa.[29] In particular, the implicit market value of a firm's assets can be derived from the market value of the firm's equity without knowing the market value of its debt, provided that the principal amount of the debt and interest payment schedule are known (along with other variables detailed *infra*).[30]

In this Article, I apply Options-Pricing Theory to the controversy surrounding recovery ratios in section 363 sales and reorganizations. I start by showing that pre-bankruptcy market values calculated from an options-pricing model more accurately predict bankruptcy recoveries than do pre-bankruptcy book-asset values. Then, I test the hypothesis that the firms sold under section 363 entered bankruptcy with lower ratios of market value to book-asset value than the firms that completed reorganization. I find that the section 363 firms entered bankruptcy with implied market values equal to 82% of their book-asset values on average, while reorganized firms entered bankruptcy with implied market values equal to 106% of their book-asset values on average. This systematic difference in relative values, which is statistically significant and not explained by differences in earnings, substantiates White's allegation that LoPucki and Doherty's analysis was inherently biased against section 363 firms.

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[26] White forwent all statistical analysis in his discussion of selection bias. *Id.* at 702–03.

[27] *See generally* Franco Modigliani & Merton Miller, *The Cost of Capital, Corporation Finance and the Theory of Investment*, 48 AM. ECON. REV. 261 (1958) (establishing and discussing Modigliani-Miller theorem).

[28] *See generally* Fischer Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 J. POL. ECON. 637, 637–38 (1973) (articulating stockholders have call option on company's assets); Robert C. Merton, *On the Pricing of Corporate Debt: The Risk Structure of Interest Rates*, 29 J. FIN. 449, 453–54 (1974) (explaining how, under simplified conditions, firm's equity and debt are valued using equation for European call option on common stock).

[29] *See* Black & Scholes, *supra* note 28, at 638 (determining option value by price of stock).

[30] *See id.* at 640–45 (determining value by price of stock and assuming ideal market conditions).

To remove that bias, I ran LoPucki and Doherty's analysis with recovery ratios measured as proportions of implied market value rather than book-asset value. Reorganized firms recover 69% of their initial market values on average, while firms sold under section 363 recover 38% of their initial market values on average. The statistical significance of the difference in average recovery ratios is marginal (p=.08) after controlling for other systematic factors, indicating a considerable chance that the difference in average recovery ratios is just a manifestation of randomness in the dataset.

Although my analysis improves upon prior methodologies by calculating recovery ratios as proportions of initial market value (rather than book-asset value or TEV), there remains an inexorable methodological bias in the calculation of bankruptcy recoveries that further undermines the argument that reorganizations enjoy higher recovery ratios than section 363 sales. In LoPucki and Doherty's analysis, White's analysis, and my own, the recovery values of section 363 firms were computed from asset purchase agreements, whereas the recovery values of reorganized firms were computed from financial statements prepared in conformance with Generally Accepted Accounting Principles ("GAAP"). I find that in the handful of sales cases for which the recovery values could be computed from GAAP financial statements, those recovery values were on average 1.4 times as large as the recovery values computed from the respective asset purchase agreements. This finding suggests that whatever difference exists between the average recovery ratios of reorganized firms and section 363 firms may be attributable to asymmetries in the measurement of recoveries.

I. AN OPTIONS APPROACH TO VALUING DISTRESSED FIRMS

An option confers on its holder the right, but not the obligation, to engage in a specified transaction.[31] The most widely recognized example of an option is the right to buy or sell stock at a fixed price; however, financial economists recognize that, where the exercise of any right depends on the value of an underlying asset, it can also be viewed and priced as an option.[32] Of particular importance to us is a firm's common stock, which constitutes an option on the value of the firm's assets.[33]

In a simplified setting where the firm's liabilities all mature on one date, stockholders possess a standard call option.[34] At the maturity date, stockholders choose between (i) paying the amount owed in order to "buy" the firm from

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[31] *See* JOHN C. HULL, OPTIONS, FUTURES, AND OTHER DERIVATIVES 6–7 (Prentice Hall ed., 6th ed. 2006) ("It should be emphasized that an option gives the holder the right to do something. The holder does not have to exercise that right.").

[32] *See* Robert Geske, *The Valuation of Compound Options*, 7 J. FIN. ECONS. 63, 63 (1979) [hereinafter Geske I] (describing option as any purchase opportunity based on value of underlying assets).

[33] *See* Black & Scholes, *supra* note 28, at 649–50 (explaining "stockholders have the equivalent of an option on their company's assets").

[34] *See id.* at 637 (noting call option is right to purchase share of common stock at specific price and time).

creditors and (ii) handing creditors the proverbial keys to the shop.[35] Stockholders will pay creditors if the firm is worth more on the maturity date than the amount owed; otherwise, stockholders are better off giving creditors the firm.[36] Prior to the maturity date, the firm's equity may be valuable even if the value of the firm's assets is much less than the face amount of the firm's obligations. This is true for the same reason that an option to buy a share of stock for $30 several months from today may be valuable even if the stock is currently trading for only $20 per share. The value of such an out-of-the-money option inheres in the chance that it will become in-the-money by the expiration date.

In the more realistic setting, where various interest and principal payments come due sequentially, stockholders possess a compound call option. Each time an obligation comes due, stockholders choose between (i) paying the amount due in order to buy the next option in the sequence and (ii) handing over the firm to creditors.[37] Stockholders will pay an obligation that has come due if the value of the next option in the sequence exceeds the amount of the obligation; otherwise, stockholders are better off forfeiting their equity than paying their debt.[38] Through this chain of options-on-options, the value of equity at any moment is ultimately

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[35] *See, e.g.*, Robert Geske, *The Valuation of Corporate Liabilities as Compound Options*, 12 J. FIN. & QUANTITATIVE ANALYSIS 541, 542 (1977) [hereinafter Geske II] ("[U]ntil the final payments, the stockholders have the option of buying the next option by paying the coupon or forfeiting the firm to the bondholders."). It is essential to realize that if stockholders exercise the right to buy the firm, stockholders need not pay creditors in cash directly out of stockholders' own pockets. Options-pricing models incorporate the natural assumption that stockholders who pay obligations generally do so by refinancing, which entails issuing new securities equal in value to the amount owed. *See id.* at 550 (stating firms may pay off senior debt by issuing new equity equal in value).

[36] *See* HULL, *supra* note 31, at 490 (explaining if value of company's assets is less than amount of principal and interest immediately due, it is in theory rational for company to default on its debt). Of course, practical and strategic considerations may prevent a firm's equity from fitting neatly within this theoretical framework. For instance, stockholders who are in the money at the maturity date of the firm's obligations could find themselves forfeiting value; this occurs if turmoil in financial markets prevents them from refinancing the obligations of a valuable enterprise at a time when operating cash flows are insufficient to pay obligations due. *See, e.g.*, *In re* Gen. Growth Props., Inc., 409 B.R. 43, 53–54 (Bankr. S.D.N.Y. 2009) (discussing situation where, due to credit market crisis, company could not refinance losing operating cash flow needed to pay financial obligations). Alternatively, stockholders who are out of the money at the maturity date of the firm's obligations may still be able to extract value from the firm by dint of the debtor's physical dominion over the firm's assets and privileged role in drafting a plan during bankruptcy. *See* 11 U.S.C. §§ 1107, 1121(b) (2006) (noting sections 1107 and 1121(b) respectively continue debtor's possession of firm's assets during pendency of bankruptcy case and prevent non-debtor parties from filing plan of reorganization for first 120 days following petition date). Additionally, section 502(b)(2), which discontinues the accrual of interest on unsecured claims during the pendency of bankruptcy, may allow stockholders to retain value while paying less than the present value of obligations at the time the payment is made. *See* § 502(b)(2) (mandating if there is objection to claim, court shall determine its value unless it is for unmatured interest). Notwithstanding these cross-cutting imperfections of the theoretical framework, viewing equity as an option whose exercise depends on the value of the firm's assets captures the essence of equity's position in the capital structure, which is why the options framework is so ingrained in the financial literature. *See supra* note 28.

[37] *See* Geske II, *supra* note 35, at 542 (explaining stockholders may either buy next option by paying coupon or forfeit firm to bondholders up until time of final payments).

[38] *See id.* (indicating next option will not be purchased if equity is lower than value of payment).

linked to the value of the firm.[39] Prior to the expiration of the final option in the chain, equity's right to keep playing the options-on-options game may be valuable even if the value of the firm's assets is much less than the face amount of the firm's obligations. Again, this value inheres in the chance that equity will eventually land in the money.

A. The Valuation Model

In 1973, Fischer Black, Myron Scholes and Robert Merton demonstrated that under now ubiquitous economic assumptions,[40] the value of a simple call option could be calculated from the value of the asset underlying the option, or vice versa, given the volatility of the underlying asset, the option's strike price, the option's expiration date, and the risk-free interest rate.[41] The Black-Scholes-Merton formula was later generalized to encompass compound options, including stockholders' option on the value of a firm whose obligations come due sequentially.[42] The variables relating the value of a compound call option to the value of the underlying asset are the same as for a simple option,[43] though the functional form of the relationship is an order of magnitude more complex. In the case where the underlying asset is a firm and the compound call option is its common stock, the strike prices correspond to the face amounts of the firm's obligations including scheduled interest payments, and the expiration dates correspond to the maturity dates of those obligations.[44]

Although theoretical models can accommodate any number of options on options, implementing these models becomes more computationally taxing with the addition of each option to the sequence.[45] For that reason, the model utilized in this

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[39] *See id.* (suggesting whenever value of equity is less than value of payment, firm will not find purchasers for its stock).

[40] The assumptions necessary to derive the Black-Scholes-Merton differential equation are the following: the underlying asset follows a Brownian motion; security trading is continuous; the risk-free interest rate is constant; there are no tax considerations or prohibitive transaction costs; there are no riskless arbitrage opportunities; it is possible to buy, sell, sell short, and divide any asset. *See* HULL, *supra* note 31, at 290–91 (listing each assumption underlying Black-Scholes-Merton differential equation). To the extent that these assumptions do not hold, the model value may deviate from the "true" market value of a firm's assets. For that reason, before replacing book-asset values with implied market value in the calculation of recovery ratios, I explicitly test the degree to which the values calculated from the model predict bankruptcy recoveries. *See infra* Part I.C.

[41] *See* Robert C. Merton, *Theory of Rational Option Pricing*, 4 BELL J. ECON. & MGMT. SCI. 141, 142–50 (1973) (listing factors used in option pricing); *see also* Black & Scholes, *supra* note 28, at 638 (describing various factors affecting value of call options).

[42] *See* Geske I, *supra* note 32, at 63–64 (discussing situations to which general theory has been expanded and applied).

[43] *See id.* at 67–68 (demonstrating equations used for valuing simple options and compound options).

[44] *See* HULL, *supra* note 31, at 490 (defining variables of options model when underlying asset is firm and call option is its common stock).

[45] *See generally* Geske II, *supra* note 35 (demonstrating complexity of mathematical equations as options are added to sequence). Among other complications, compound option models require integrating an n-dimensional multivariate normal distribution function, where n is the number of options in the sequence. *See id.* at 548 (outlining mathematical formula used when there is compound option).

Article reduces the firm's capital structure to two options in sequence, corresponding to the convention of distinguishing between current and long-term obligations.[46] In this two-option model, it is presumed that until the filing of a bankruptcy petition, equity possesses the option of paying the firm's current obligations at their due date in order to acquire the option of paying the firm's long-term obligations at their due date in order to acquire the firm's assets. Under this conceptualization of the firm's capital structure, the system of equations that expresses the relationship between the value of equity and the value of the firm's assets is given in Appendix A.[47]

The role played by each variable in relating the value of equity to the value of the firm can be understood intuitively without getting bogged down in the mathematics. When the value of the firm's assets is more volatile, the potential upside for the option holder is greater and hence, the value of equity is greater given any value of the firm's assets.[48] Likewise, when the maturity of a firm's obligations is further in the future, the potential upside that might be realized before maturity is greater, and hence the value of equity is greater given any value of the firm's assets. When the risk-free interest rate is higher, the present value of the fixed payments that equity will make if it chooses to buy the firm from creditors is lower, and hence the value of equity is greater. Finally, when the face amount of the firm's obligations is higher relative to the value of the firm's assets, equity is less in the money or more out of the money, and hence the value of equity is lower.

Because I solve for the value of a firm's assets using the value of its equity, it is helpful to run the foregoing logic in reverse. Given an observed equity value, the value of the firm's assets implied by that equity value is higher when the volatility of assets is lower, when the risk free interest rate is lower, and when the face amount of the firm's obligations is higher. And of course, the higher the firm's equity value, the higher the implied value of the firm's assets, other things equal.

B. Methodology in Applying the Valuation Model

This section applies the compound options model explained above to calculate a pre-bankruptcy implied market value for each firm included in LoPucki and Doherty's regression analysis. Calculating each pre-bankruptcy implied market value from the model requires us to determine the values of the following variables: the value of each firm's common stock prior to bankruptcy, the amount of each

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[46] I am not aware of any empirical work that ventures beyond two options in analyzing a firm or its capital structure. Most empirical works seem content to acknowledge the enhanced realism afforded by compound option models, but ultimately choose a single-maturity model presumably for computational ease. *See, e.g.*, Stephen A. Hillegeist, et al., *Assessing the Probability of Bankruptcy*, 9 REV. ACCT. STUD. 5, 32 n.5 (2004) (acknowledging realistic assumptions allowing for debt covenants and cases of multiple debt, but applying only single-maturity model).

[47] *See infra* app. A. These equations represent the pricing model for a "call on a call" option where the underlying asset pays no dividend. *See* HULL, *supra* note 31, at 532 (stating general equation for call on call option).

[48] Remember that the downside facing an option holder is fixed at the cost of the option.

firm's current and long-term obligations, the due dates of those obligations, the risk free rate of interest at the time of valuation, and the volatility of each firm's asset returns.

1. The Value of Common Stock Prior to Bankruptcy

The value of each firm's common stock was calculated by multiplying the number of shares outstanding by the closing price per share of common stock on the valuation date. The valuation date was generally the last day prior to bankruptcy for which public prices were recorded by the Center for Research in Securities Prices.[49] However, if the debtor filed Form 8-K with the SEC announcing the terms of a pre-packaged or pre-negotiated plan before the filing of the bankruptcy petition, then the valuation date was the earlier of (i) the last day prior to bankruptcy for which public prices were recorded by the Center for Research in Securities Prices and (ii) the day before the 8-K filing. This modification to the valuation date is necessary because once the terms of a deal are announced, the firm's stock price should reflect the known terms of the deal rather than any option value inherent in the stock, making the options-pricing model inapplicable.[50]

Of the forty-nine cases included in LoPucki and Doherty's regression analysis,[51] equity values could be determined for forty-three.[52] In three of the six cases for which no equity values could be determined, there was simply no market for the

[49] Prices were collected from the Center for Research in Securities Prices ("CRSP"), accessed through the Wharton Research Database. *See* WHARTON RESEARCH DATA SERVICES, http://wrds.wharton.upenn.edu/ (last visited Mar. 20, 2011). For the following three firms, the market prices were not available for the year prior to bankruptcy in CRSP but were reported in the company's public financial statements filed with the Securities and Exchange Commission ("SEC"): Coho Energy, Inc., Sterling Chemical Holdings, Inc., and Weirton Steel Corp. In those cases, I used the prices reported in their public financial statements. *See Filings and Forms*, U.S. SECS. & EXCH. COMM'N, http://www.sec.gov/edgar.shtml (last visited Mar. 20, 2011). For many firms, more recent stock prices could have been purchased from vendors of over-the-counter market data, but in my opinion, the benefit of moving the valuation date forward a few days or weeks was outweighed by the cost of relying on illiquid over-the-counter trading data. For all firms, the number of shares outstanding was taken from the firm's last financial statement prior to the valuation date. If two classes of common stock were outstanding that differed only in voting rights, I assumed that each class of stock had the same value per share unless separate prices were available. Preferred stock, however, was treated not as common equity, but as an obligation on account of its superior position in the capital structure relative to common stock.

[50] I cannot rule out the possibility that stock market participants became aware of the terms of a pending reorganization or sale before the debtor either filed for bankruptcy or filed Form 8-K. If that were the case, on the valuation date, market participants may have already adjusted their valuations of the debtor in anticipation of whether or not it would be sold or reorganized. That would bias the results of my analysis if market participants had expected systematically different recoveries or treatments of common stock in sales and reorganizations. An event study would be needed to determine what the market knew and when, but filing a public disclosure statement via Form 8-K seems to be the most salient event.

[51] *See* LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 16, 23 tbl.1 (studying forty-nine going-concern sales and reorganization cases).

[52] Thus, six cases that were included in LoPucki and Doherty's analysis had to be excluded from mine. Appendix C demonstrates that the exclusion of these cases does not affect their results. *See infra* app. C.

firm's equity in years prior to the petition date.[53] In the other three, the corporation that filed public financial statements and whose common stock was publicly traded, was a parent or subsidiary of the entity that filed for bankruptcy; thus there was not a direct correspondence between the entity being valued and the entity in bankruptcy.[54] As for the forty-three firms for which equity prices were determinable, the number of days by which the valuation date preceded the petition date ranged from one day to eleven months, and was seventy-three days on average.[55] Appendix B reports the value of each firm's common stock on the valuation date.[56]

2. The Amount of Current and Long-Term Obligations

Each firm's current and long-term obligations were taken from its last financial statements dated prior to the valuation date.[57] I use the word obligations to denote amounts that must be paid in order for common stockholders to exercise their compound call option on the firm's assets. A firm's obligations defined in that way differ from the liabilities on its balance sheet in a few important respects. First, balance sheet liabilities do not include scheduled interest payments that have not yet accrued,[58] but such interest payments are nonetheless part of the obligation that must be met for common equity to exercise its call option on the firm's assets.[59]

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[53] The debtors in these three cases were DTI Teleport, Inc., Purina Mills, Inc., and Wherehouse Entertainment, Inc.

[54] The debtors in these three cases were Globalstar, L.P., NTL, Inc., and Wheeling Pittsburgh Corp.

[55] Before running the analysis described in subsequent sections, I tested whether the number of days between the last public trading date and the petition date was a correlate of bankruptcy recoveries. It was not at the .1 level of statistical significance.

[56] *See infra* app. B.

[57] I gathered the data directly from annual and quarterly reports (Forms 10-K and 10-Q, respectively) and accompanying notes filed with the SEC. *See Form 10-K*, U.S. SECS. & EXCH. COMM'N, http://www.sec.gov/answers/form10k.htm (last visited Mar. 12, 2011); *see also Form 10-Q*, U.S. SECS. & EXCH. COMM'N, http://www.sec.gov/about/forms/form10-q.pdf (last visited Mar. 12, 2011).

[58] *See generally* INTEREST ON RECEIVABLES AND PAYABLES, Opinion of the Acct. Principles Bd. No. 21 (Am. Inst. of Certified Pub. Accountants 1971) (showing premiums and discounts are not reported as separate asset or liability).

[59] *See* HULL, *supra* note 31, at 490 (defining strike price of call option on firm's assets as including both principal and interest). The valuation is unaffected if, rather than paying scheduled interest and principal at the scheduled payment dates, equity holders pay the present value of those amounts at an earlier date, as in a restructuring. This follows from the usual meaning of present value (a present amount equivalent in economic worth to some larger amount(s) received in the future) and the fact that the value of equity equals the value of the firm less the value of obligations. However, if stockholders anticipate that they will be able to capture value while paying one or more creditors less than the present value of scheduled interest and principal, the true value of the firm's assets will be less than what is calculated from the model, as part of the market value of stock will represent potential transfers from creditors rather than potential moneyness of equity. This is true because when imputing the value of the firm's assets, the model assumes that the market value of the stock reflects potential moneyness of the equity; if the market value of the stock overstates the potential moneyness of equity by incorporating the value of transfers, the imputed value of the firm will be overstated as well.

Second, balance sheet liabilities do not generally include preferred stock,[60] but preferred stock must be retired for common equity to exercise its call option on the firm's assets.[61] Third, balance sheet liabilities sometimes include deferred profits, but deferred profits are not actually owed to anyone.[62] Thus, the relationship between balance sheet liabilities and obligations can be written $K = L + SI + PS - DP$, where K represents obligations, L represents balance sheet liabilities stated at face value, SI represents scheduled interest payments, PS represents preferred stock, and DP represents deferred profit.

To determine the amount of scheduled interest to be added to balance sheet liabilities in computing obligations for purposes of the options model, I looked in the notes to each financial statement. I relied on the schedule of interest payments where one was provided in the notes. If scheduled interest payments were not given, but interest rates were given for interest bearing liabilities, then I multiplied each interest rate by the respective liability in order to determine the scheduled interest payment in each year until that liability matured. For firms that provided neither scheduled interest payments nor scheduled interest rates, I calculated the scheduled interest payments at the firm level by multiplying the average interest rate (calculated as the ratio of cash interest expense to liabilities) by the total unmatured liabilities in each year. To determine the amount of preferred stock to be added to balance sheet liabilities, I simply looked at the balance sheet to see whether the company had preferred stock listed as equity in its capital structure. If it did, I added the face amount listed. To determine the amount of deferred profit to be subtracted from liabilities, I simply looked at the balance sheet to see whether a deferred profit account was listed. If it was, I subtracted the amount listed.

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[60] *See* Carrieri v. Jobs.com Inc., 393 F.3d 508, 523 (5th Cir. 2004) (holding preferred stock is equity interest rather than claim in bankruptcy). Preferred stock is typically classified as equity on balance sheets. *See* ELEMENTS OF FIN. STATEMENTS, Statement of Fin. Accounting Concepts No. 6, ¶¶ 60–63 (Fin. Accounting Standards Bd. 1985) [hereinafter SFAC 6]. In recent years, preferred stock has been treated as a liability in special cases to reflect its hybrid nature. *See* ACCOUNTING FOR CERTAIN FIN. INSTRUMENTS WITH CHARACTERISTICS OF BOTH LIABS & EQUITY, Statement of Fin. Accounting Standards No. 150, ¶ A24 (Fin. Accounting Standards Bd. 2003).

[61] By definition, preferred stock stands in front of common equity in the capital structure. *See* Otis & Co. v. SEC, 323 U.S. 624, 649 (1945) (explaining preferred stockholders "stipulated and paid for the specified priority over the common stockholders in the distribution of the net corporate assets"). Thus, in order to "buy" the firm's assets, common equity holders must pay off preferred stock holders just as common equity holders must pay off any other superior claimants. *See* SFAC 6, *supra* note 60, at ¶ 62 (emphasizing there are several classes of stock with different levels of priority). Otherwise, upon exercising its option, common equity would receive only the value of the firm's assets less the value belonging to preferred stock. *See id.* (explaining preferred stock has different rights with respect to distribution).

[62] *See* SFAC 6, ¶ 232 (explaining deferred profits are not revenue or gain). Although deferred profits are sometimes represented as liabilities on balance sheets, they are really asset-valuation accounts or placeholders for future income. *See id.* at ¶¶ 232–34 (articulating deferred profit represents future gain or revenue). Any account labeled "deferred gain" or "deferred revenue" was treated in the same manner as deferred profit. Deferred revenue often includes some future performance, which is costly, in addition to a profit component. *See* SEC Staff Accounting Bulletin, Release No. SAB 101, 71 SEC Docket 590, 15–16 (Dec. 3, 1999) [hereinafter SAB 101]. As such, including deferred revenue as an obligation would have been a reasonable approach, but for consistency, I excluded deferred revenue along with deferred gain and deferred profit.

Because equity is presumed to hold the compound option of paying the firm's current obligations to acquire the option of paying the firm's long-term obligations, it is necessary to distinguish between the amount of current obligations and the amount of long-term obligations, as these amounts represent the strike prices of two distinct options. For the most part, I followed the balance sheet, which classifies current liabilities as those coming due within one year of the balance sheet date.[63] However, an adjustment was needed in cases where the balance sheet indicated that Statement of Financial Accounting Standard No. 78 ("SFAS 78") had been applied. SFAS 78 requires a debtor in technical default under the terms of an indenture to report all affected liabilities as current, even if creditors have not demanded and are not expected to demand accelerated repayment of the debt, as long as the default gives creditors the right to accelerate.[64] Rather than attempt to subjectively determine which debts should be considered genuinely accelerated on a case-by-case basis, I simply classified every obligation according to its original payment dates. In other words, I assumed that in every case, equity retained its original compound call option until the filing of the bankruptcy petition.[65] Finally, in the rare case that a liability was not classified as current or long-term on the balance sheet, I classified it as current unless the notes to the financial statements showed otherwise. Appendix B reports the amount of each firm's current and long-term obligations.

3. The Due Dates of Current and Long-Term Obligations

Having determined the amount of current obligations and the amount of long-term obligations, I had to assign due dates to those amounts, which represent the expiration dates of equity's compound option. I assumed that each firm's current obligations were due thirty days after the firm's valuation date.[66] I assumed that each firm's long-term obligations were due at their weighted average due dates. The weighted average due date of a firm's long-term obligations was calculated by weighting the due date of each long-term obligation by the amount of that obligation. The due date of each obligation was determined from the notes to the

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[63] *See* RESTATEMENT & REVISIONS OF ACCOUNTING RESEARCH BULLETINS, Accounting Research Bulletin No. 43, Ch. 3, ¶ 7 (Am. Inst. of Certified Pub. Accountants 1953) (explaining term "current liabilities" includes liabilities whose ordinary liquidation is expected to occur within twelve months).

[64] CLASSIFICATION OF OBLIGATIONS THAT ARE CALLABLE BY CREDITOR, Statement of Fin. Accounting Standards No. 78, ¶¶ 5, 13 (Fin. Accounting Standards Bd. 1983) (stating if creditor, at date of balance sheet or within one year of such, has "the unilateral right to demand immediate repayment of the debt . . . the obligation should be classified as a current liability" on balance sheet).

[65] Of course, in every case the probability that equity would exercise its options became ever smaller as the firm's value deteriorated. That consideration is intrinsic to the options model.

[66] I settled on thirty days as the maturity date of current liabilities in recognition of the fact that trade credit is often extended over thirty-day intervals. It also would have been reasonable to choose six months as the maturity of current obligations since current liabilities can mature anywhere from one day to one year in the future, which makes six months the half-way point. If six months had been chosen as the maturity date of current liabilities, the implied value of every firm would have been slightly lower.

financial statements, which are required to list the obligations coming due in each of the next five years and list a single amount representing obligations coming due after five years.[67] If a firm listed an amount as coming due after five years without providing any further detail in the notes, I assumed that the amount was scheduled to mature evenly across years five through ten. If an individual long-term obligation was not assigned any maturity date in the notes to a firm's financial statements, I assumed that the obligation would come due on the weighted average due date of the other obligations. Appendix B lists the due date of each firm's current and long-term obligations, in years from the valuation date.[68]

4. The Risk-Free Rate

The risk free rate, which was separately determined for each firm, was assumed to equal the market rate of interest on a five-year Treasury note at the valuation date.[69] If a market rate was not reported on a particular valuation date, the prior day's rate was used instead. Appendix B lists the risk-free rate for each firm in the sample.

5. The Volatility of Asset Returns

The volatility of a firm's asset returns is not directly observable. Rather, we observe only the volatility of a firm's equity returns, which is continuously changing and substantially higher than the volatility of a firm's asset returns due to leverage. When a firm's leverage ratio (the ratio of assets to equity) is relatively stable during the period over which its equity volatility is observed, the firm's asset volatility can be approximated by unlevering its equity volatility.[70] Unfortunately, the unlevering technique cannot be easily applied to distressed firms because, even over short periods, their leverage ratios may change substantially.[71] To sidestep that problem, I

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[67] *See generally* DISCLOSURE OF LONG-TERM OBLIGATIONS, Statement of Fin. Accounting Standards No. 47, ¶¶ 7, 10 (Fin. Accounting Standards Bd. 1981) (requiring recorded and unrecorded obligations to be listed for five succeeding years).

[68] *See infra* app. B.

[69] Historical treasury rates were found on the Federal Reserve Board's economic database. *See* BOARD OF GOVERNORS FEDERAL RESERVE SYSTEM, http://www.federalreserve.gov/releases/h15/data/Business_day/H15_TCMNOM_Y5.txt (last visited Feb. 1, 2010).

[70] The standard unlevering equation, which would be solved simultaneously with the options pricing system, assumes that equity volatility is observed over an infinitely short interval at the same moment the equity value is observed. This would allow for seamless unlevering. *See* HULL, *supra* note 31, at 490 (estimating instantaneous volatility of firm's assets from instantaneous volatility of its equity).

[71] The leverage ratio of a distressed firm changes violently in response to even minor perturbations in its equity price because its equity value (the denominator in the leverage ratio) is tiny in relation to its asset value (the numerator in the leverage ratio). Dramatic changes in leverage ratios are problematic because there is no way of knowing what leverage ratio to apply when unlevering an equity volatility calculated over a period in which the leverage ratio changed substantially. If we had second-by-second trading data for the equity of each firm in the sample, we could calculate volatilities over intervals so short that changes in the leverage ratio would not be confounding, but we do not have that data for the firms in the sample.

use the volatility of similar assets as a proxy for the volatility of each firm's assets. For each firm, I define similar assets as the assets of other firms whose four-digit Standard Industrial Classification (SIC) codes matched the SIC code of the firm being valued and whose market caps exceeded $50 million.[72] These firms' assets, being of similar nature and scale to the debtor's assets, presumably follow similar stochastic processes.

To facilitate the calculation of asset volatilities, I filtered the similar-asset firms on the basis of their leverage ratios, keeping only similar-asset firms whose equity values were at least half of their total market caps.[73] The asset volatility of a low-leverage firm is relatively easy to calculate because the value of its debt doesn't change much, since the risk of default is low. Hence, for firms with a thick equity cushion, changes in the value of equity approximate changes in the value of the underlying assets, as is the case for any deep-in-the-money option.[74] That property allows us to approximate the asset returns of the low-leverage, similar-assets firms using the simple unlevering formula $r_{E,i}(E_i/V_i) \approx r_{V,i}$ where E_i is the value of equity at the beginning of period i, V_i is the market cap of the firm at the beginning of period i, $r_{E,i}$ is the equity return during period i, and $r_{V,i}$ is the asset return during period i.[75]

Using that formula, I calculated the monthly asset returns belonging to each low-leverage similar-assets firm in each of the twenty-four months preceding the valuation date of the firm in the sample whose assets were being proxied.[76] That

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[72] Market caps were found in Capital IQ – Compustat ("Compustat") for the year prior to the valuation date of the firm whose assets were being proxied. *See* WHARTON RESEARCH DATA SERVICES, http://wrds.wharton.upenn.edu/ (last visited Mar. 20, 2011). Market cap is defined by Compustat as the market value of a firm's equity plus the book value of its liabilities. *See id.* Because the pool of similar asset firms was restricted to solvent firms, see *infra*, the book values of those firms' liabilities are reasonable approximations of their market values. The SIC codes also came from Compustat. *See id.* Spectrasite Communications was the one company whose four-digit SIC code (4899) lumped it into a "not elsewhere classified" category; I classified Spectrasite with telephone communications companies (SIC 4813), as Spectrasite derived over 80% of its revenue from the operation of cell-phone towers in the year prior to its bankruptcy filing. *See* SpectraSite Inc., Annual Report (Form 10-K) (Mar. 8, 2003) (showing company earned $282,525 from site leasing and total revenue of $309,334 in 2002).

[73] Total market caps and equity values were again taken from Compustat, as of the last reporting period prior to the valuation date of the firm whose assets were being proxied. Limiting the set of similar-asset firms to those with low leverage ratios does not predictably affect the calculated volatility (other than to make the calculation easier), as the Modigliani-Miller theorem holds that the value of a firm's assets at any point in time (and hence the volatility of those assets across any period) is independent of capital structure. *See* Modigliani & Miller, *supra* note 27, at 268–69 (asserting value of firm "is equal to the capitalization rate of a pure equity stream of its class").

[74] The Modigliani-Miller theorem directly implies that the change in the value of a firm's assets during any period equals the change in the value of its equity plus the change in the value of its debt (or other obligations), which can be written $\Delta E_i + \Delta D_i = \Delta V_i$. *See id.* (implying if firm does not depend upon capital structure value is simplified to equity and debt). If a firm has an equity cushion so thick that the value of its debt hardly moves from period to period, then the foregoing equation becomes $\Delta E_i \approx \Delta V_i$. *See id.* (implying change in debt is zero then $\Delta E_i \approx \Delta V_i$).

[75] Starting with $\Delta E_i \approx \Delta V_i$, divide both sides by V_i and then multiply the left side by E_i / E_i to arrive at $r_{E,i}(E_i/V_i) \approx r_{V,i}$.

[76] Equity values at the beginning of each month, market caps at the beginning of each month, and monthly returns were all taken from Compustat. *See* WHARTON RESEARCH DATA SERVICES, *supra* note 72. If more

step yielded forty-three collections of similar-asset returns corresponding to the forty-three distressed firms in the dataset. For each such collection of similar-asset returns, I calculated an annualized volatility. These volatilities serve as proxies for the asset-return volatilities of corresponding firms in the data set. Appendix B reports this volatility for each firm.[77]

6. Calculating the Implied Market Value of Assets

Having determined the values of the above variables for each of the forty-three firms in the dataset, I solved for the pre-bankruptcy implied market value of each firm's assets using the system of equations in Appendix A.[78] Calculating a solution to the system of equations for each firm requires a computer-executed search algorithm; I used Solver in Microsoft Excel. Appendix B reports the pre-bankruptcy implied market value of assets calculated for each firm in the sample.

C. Comparing Implied Market Value and Book Value as Determinants of Bankruptcy Recovery

Before incorporating implied market values into the regressions formulated by LoPucki and Doherty, I verified that the numbers calculated for the firms in the dataset actually represent sensible valuations—not just arbitrary numbers concocted in a caldron of mathematical theory from volatilities and eye of newt.

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than one hundred low-leverage, similar-assets firms were listed as corresponding to a particular distressed firm in the sample, then asset returns were only calculated for the one hundred similar-assets firms with the lowest leverage ratios. Finally, all firms whose equity traded for less than $1 per share were excluded because such firms were frequently missing data and the data that existed sometimes represented over-the-counter trades. Such penny-stocks also tended to exhibit rapidly shifting leverage ratios, which is precisely the problem we wanted to circumvent in the first place.

[77] *See infra* app. B.

[78] *See infra* app. A.

Figure 1: The Relationship between Implied Market Value and Book Assets

The figure depicts each firm's implied market value and book-asset value on logarithmic scales. The line bisecting the figure is drawn at 45 degrees so that any point on the line represents a firm whose implied market value equals its book-asset value. The proximity of all points to the line evidences a strong, positive relationship between implied market value and book assets.

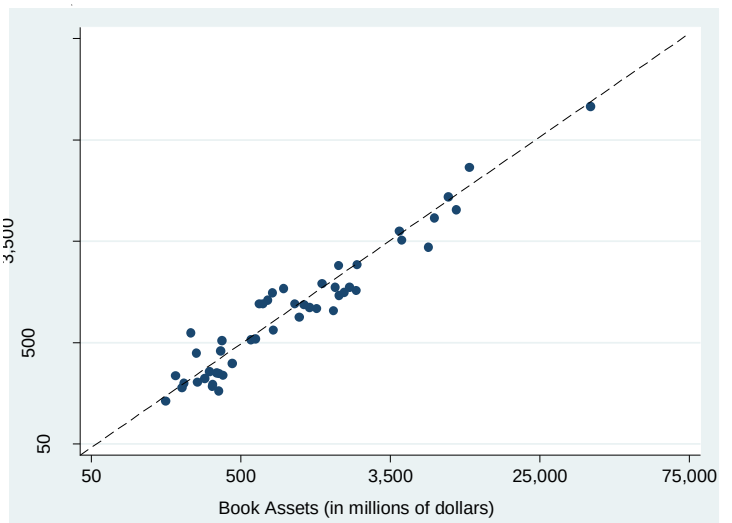
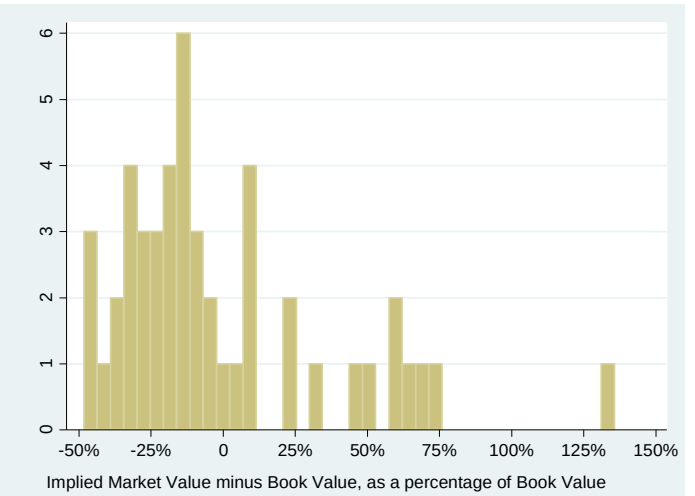


Figure 2: Differences between Implied Market Value and Book Assets

The figure displays the frequency and magnitude of differences between implied market value and book asset value. The differences are expressed as a percentage of book value. In twenty-two of the forty-three cases depicted, the absolute difference is greater than 25% of book value.



To assess the reasonableness of the implied market values, I first look for a relationship between implied market values and book-asset values (Figure 1). The correlation between the logarithm of implied market value and the logarithm of book-asset value is 0.96,[79] indicating a strong positive relationship between the variables. It is encouraging that the calculation of implied market value, which at no point considered the book value of assets (or any other direct measure of assets), nonetheless tracked book assets closely.

Although highly correlated, implied market values and book-asset values differ in nearly all cases (Figure 2). The median absolute difference between implied market value and book value, expressed as a percentage of book value, is 24% in the dataset. These deviations of implied market value from book-asset value are large enough to potentially change the results of an analysis where bankruptcy recoveries are measured as a proportion of the value of the firm at the outset of bankruptcy.

The imminent question is whether the deviations of implied market value from book-asset value contribute information relevant to determining bankruptcy recoveries, or contribute merely noise. As a first step toward answering that

[79] The correlation represents Pearson's correlation coefficient. The relationship was analyzed in logarithmic form because book-asset values and implied market values are both log-normally distributed.

question, I run two single-variable regressions in which bankruptcy recovery value, as calculated by LoPucki and Doherty, serves as the dependent variable.[80]

Table 1: Comparing Implied Market Value and Book-asset Value as Determinants of Recovery Value:

Cell entries are ordinary least squares coefficients (with robust standard errors in parentheses).

	I.	II.	III.	IV.
Book-asset Value	0.960*** (0.106)		0.969*** (0.093)	
Implied Market Value		1.009*** (0.091)		1.011*** (0.092)
Implied Market Value Residual			1.251*** (0.334)	
Book-asset Value Residual				-0.253 0.337
Constant	0.060 2.214	-0.889 1.894	-0.119 1.928	-0.915 1.904
Total Variation in Dependent Variable	93.7	93.7	93.7	93.7
R-squared	.66	.75	.75	.75
N	43	43	43	43
†p<.10, *p<.05, **p<.01,***p<.001 (two-tailed p-values)				

Book-asset value is the independent variable in the first regression (Model I), while implied market value is the independent variable in the second regression (Model II). All variables are expressed in logarithmic form, as they are all log-normally distributed. In order to maintain consistency throughout the Article, I restrict the sample in every regression to the same forty-three cases.[81]

[80] Lopucki and Doherty actually calculated the recovery values of reorganized firms in two ways. First, they calculated a fresh start accounting value by adding the liabilities and shareholders' equity listed in the reorganized entity's fresh start accounting statements. *See* LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 20–21 (noting fresh start accounting values are determined by emerging company's accountants). Second, they calculated a quasi-market value by adding the liabilities listed in the reorganized entity's fresh start accounting statements to the public value of its equity. *See id.* at 21 (computing "market capitalizations of the emerging companies"). Anticipating that readers would be skeptical of fresh-start accounting values, LoPucki and Doherty only reported and discussed their results obtained using recovery values computed from market equity values. *See id.* at 21 n.92 (indicating many scholars do not respect fresh-start values). Accordingly, I examine only their recovery values computed from market equity values.

[81] LoPucki and Doherty performed their analysis on forty-nine cases. *See* LoPucki, *supra* note 13. I exclude six cases in which the pre-filing implied market value could not be calculated. Appendix C shows that LoPucki and Doherty's findings are unaffected by the exclusion of those six cases. *See infra* app. C.

Not surprisingly, book-asset value and implied market value are each extremely significant determinants of bankruptcy recoveries. The p-value associated with each of these measures of pre-bankruptcy value in the regression is infinitesimally small ($p<.0000001$), indicating an unfathomably small probability that the relationship between pre-bankruptcy value and bankruptcy recovery is merely an artifact of randomness in the dataset. Furthermore, the r-squared values associated with these regressions indicate that a firm's pre-bankruptcy value—whether measured by book-asset value or by implied market value—accounts for the vast majority of the variation in bankruptcy recoveries.

As between these two potential measures of pre-bankruptcy value, implied market value has greater explanatory power. Implied market value explains three-quarters of the variation in bankruptcy recoveries, while book value explains only two-thirds of the variation in bankruptcy recoveries. This is preliminary evidence that a firm's implied market value is a better source of information than its book value in predicting its bankruptcy recovery.

To substantiate that preliminary finding, I construct two additional regressions, each of which is conducted in two phases. The purpose of these regressions is to determine whether there is information reflected in a firm's implied market value that is not reflected in its book-asset value, or information reflected in its book-asset value that is not reflected in its implied market value, or both. Toward that end, I begin by regressing implied market value on book-asset value in order to construct an implied market value residual, which measures the portion of implied market value that is not part of book-asset value. Symmetrically, I regress book-asset value on implied market value in order to construct a book-asset residual, which measures the portion of book-asset value that is not part of implied market value. I then run two separate regressions in which bankruptcy recovery value is again the dependent variable. The independent variables in the first regression (Model III) are book-asset value and the implied market value residual, while the independent variables in the latter regression (Model IV) are implied market value and the book-asset residual.

The implied market value residual is extremely statistically significant ($p<.0001$) and explains roughly one-quarter of the portion of variation in bankruptcy recoveries not explained by book-asset value. The positive coefficient associated with the implied market value residual indicates that when the implied market value is higher (lower) than predicted by book assets, the bankruptcy recovery will also be higher (lower) than predicted by book assets. In contrast, the book-asset residual is nowhere near statistically significant ($p=.456$) and it explains none of the variation left unexplained by implied market value.

What are we to make of this? First, implied market values reflect information missing from book-asset values. Second, to the extent that book-asset values provide information relevant to forecasting bankruptcy recoveries, such information is fully reflected in implied market values. The natural explanation of these

findings is that when valuing a company, the market carefully considers book-asset value as well as myriad other factors that bear on the value of a business.

In relation to the controversy surrounding recovery ratios in reorganizations and section 363 sales, the above findings imply not only that book-asset value is an incomplete measure of firm value, but also that replacing book-asset value with implied market value in an analysis of bankruptcy recoveries adds information without subtracting any information. The former implication potentiates the argument that LoPucki and Doherty inadequately controlled for differences in firm value, while the latter implication lights the way to remedying that inadequacy.

D. Quantifying the Relative Infirmity of Firms that were Sold

Critics of LoPucki and Doherty's analysis attribute the paltry recoveries of firms sold under section 363, in part, to the weakness of those firms relative to their reorganized counterparts at the outset of bankruptcy.[82] In this section, I evaluate the hypothesis that section 363 firms enter bankruptcy in relatively poor health. Because LoPucki and Doherty scale each recovery by its respective book-asset value, the claim that section 363 firms are especially sick has traction as an explanation of the disparity in recovery ratios only if section 363 firms enter bankruptcy with lower ratios of market value to book-asset value than reorganized firms. Such is the case, according to White, who suggests that the weakness of the section 363 firms is disguised by inflated book values.[83]

To test the hypothesis that section 363 firms enter bankruptcy with lower ratios of market value to book-asset value than reorganized firms, I calculate a market-to-book ratio for each firm in the sample by dividing its implied market value prior to bankruptcy[84] by its book-asset value prior to bankruptcy. Since this ratio is log-normally distributed in the data, I also calculate the logarithm of the ratio to reduce the influence of outliers.

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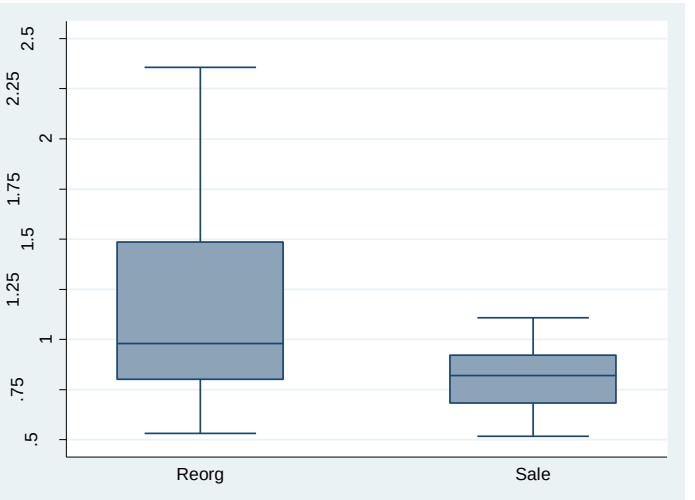
[82] *See* Douglas Baird, *H2H: Douglas Baird Responds*, UNIV. CHI. L. SCH. FACULTY. BLOG, (Oct. 1, 2007, 3:18 PM), http://uchicagolaw.typepad.com/faculty/2007/10/h2h-douglas-bai.html (Oct. 1, 2007) ("Lynn controls for firm size and EBITDA, but there is much for which he cannot control. The low sale prices might reflect that the firms that are sold tend to be dogs."); *see also* White, *supra* note 15, at 702, 704 ("[T]he firms that find their way into 363 sales are weaker from the outset and that difference, not the process, explains lower returns. . . . It is as though an epidemiologist studied the longevity of two apparently identical groups of adults, one from New York and one from New Jersey, but where every New Yorker had an undetected congenital heart defect.").

[83] White explains that if the section 363 sales firms systematically overstated their book assets while the reorganized firms did not, then the recovery ratios of section 363 sale firms would be deflated relative to what they would be under a neutral measure of initial firm value. *See id.* at 701 (explaining impact on payoff ratios if section 363 sales firms overstated asset values while reorganized firms did not). White specifically conjectures that the market values of section 363 firms' assets deteriorated faster than the accountants could keep pace. *See id.* at 701, 704 ("LoPucki and Doherty could not find reliable published financial data on seven on the sale firms within the year before their filing shows that these firms were failing so rapidly that their accountants could not keep up.").

[84] *See supra* Section I.B (detailing how implied market value was calculated).

Figure 1: Relative Firm Health at the Outset of Bankruptcy

Figure 1 depicts the ratio of pre-filing implied market value to scheduled assets in section 363 sales and reorganizations. Ratios below 1.0 imply that book assets are overstated relative to their market values, while ratios above 1.0 imply that book assets are understated relative to their market values. The line within each shaded box corresponds to the median of the data in the indicated category; the top and bottom of each shaded box correspond to the 75th and 25th percentiles, respectively; the top whisker and bottom whisker correspond to the 95th and 5th percentiles, respectively. The Figure shows that almost all of the firms sold in section 363 entered bankruptcy with overstated book values, while the reorganized firms entered bankruptcy with a mix of overstated and understated book values.



On average across all cases, prior to bankruptcy the implied market value of assets is 93% of book-asset value in the logged data (99% in the raw data). For our purposes, this average market-to-book ratio is less important than whether the average differs between section 363 firms and reorganized firms. Among reorganized firms in the dataset, implied market value is on average 106% of book-asset value in the logged data (115% in the raw data). Among section 363 firms, implied market value is on average 82% of book value in the logged data (85% in the raw data). The difference between the average book-to-market ratios of reorganized firms and section 363 firms is statistically significant (p=.02). These results indicate that when a section 363 firm and a reorganized firm each enter bankruptcy listing book assets of $1 billion, the pre-bankruptcy market value of the reorganized firm's assets exceeds the pre-bankruptcy market value of the section 363 firm's assets by about $250 million on average. In other words, the firms that

are sold are the dogs. Whether they are mangy enough to negate LoPucki's and Doherty's findings is a question addressed momentarily.

Before moving to that question, we must ask whether Earnings Before Interest Taxes Depreciation and Amortization ("EBITDA") reflects the systematic weakness of the section 363 firms. If it does, then we have not identified anything capable of rationalizing the disparity in recovery ratios identified by LoPucki and Doherty, as they control for each firm's EBITDA-to-book-assets ratio in their analysis.[85] Indeed, in anticipation of arguments concerning the relative value of the firms studied, LoPucki and Doherty specifically posit that if there were a large and systematic difference in pre-filing value not reflected in book-asset value, it would be reflected in EBITDA.[86]

Above, I identified a large and systematic difference in the pre-filing market values of reorganized firms and section 363 firms not reflected in book-asset value. I now test LoPucki and Doherty's hypothesis that this difference in relative value is reflected in EBITDA. As a preliminary test, I compare the average EBITDA-to-book-assets ratios of reorganized firms and firms that were sold in order to determine whether EBITDA reflects any weakness at all in the firms that were sold, let alone the breadth of the relative value gap identified above. EBITDA averaged over 4% of book assets for firms that were reorganized but only 2% of book assets for firms that were sold. However, the difference in these average ratios is nowhere near statistically significant (p-value = .40). Given that EBITDA reflects no statistically significant difference between reorganized firms and section 363 firms, we should not expect it to reflect the difference in relative value identified above.

To confirm that expectation, I regress the market-to-book-assets ratio on the EBITDA-to-book-assets ratio. The EBITDA-to-book-assets ratio is not statistically significant in the regression (p-value=.21) and explains only 3% of the variation in the market-to-book-assets ratio.[87] These results belie LoPucki and Doherty's assumption that systematic disparities in relative value are reflected in EBITDA.[88] Thus, in order to compare the bankruptcy recoveries of reorganized firms and section 363 firms without prejudice, we must modify LoPucki and Doherty's analysis to reflect the relatively low initial market values of the section 363 firms.

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[85] LoPucki and Doherty stated that their control variable was the logarithm of EBITDA-to-book-assets. LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 23 tbl.1 ("To control for differences in earnings, we added . . . EBITDA-to-assets ratio."). My examination of their data showed that their control variable was actually the raw value of EBITDA-to-book-assets. Taking the logarithm of EBITDA-to-book-assets would have been problematic because many of the EBITDA values are negative.

[86] *Id.* at 44 (indicating it is unlikely for differences in value to not be reflected either in book value of assets or EBITDA).

[87] The regression was repeated using the log of the market-to-book ratio, and the results were unchanged.

[88] LoPucki and Doherty controlled for two variables in addition to EBITDA that might be regarded as indirect indicators of firm strength: the fraction of distressed firms in the firm's industry, and whether the firm belonged to the telecommunications industry. *Id.* at 23 tbl.1. I found that neither of these variables is a statistically significant determinant of the pre-filing market-to-book ratio.

E. Analyzing Bankruptcy Recoveries with Regression Models that Control for Implied Market Value

LoPucki and Doherty examine the effect of disposition type (sale or reorganization) on bankruptcy recoveries in forty-nine chapter 11 cases using a series of multivariate regressions.[89] In each of their regressions, the dependent variable is the natural logarithm of the recovery ratio, which they define as the ratio of recovery value[90] to book-asset value.

LoPucki and Doherty's regression results provided fertile ground for their argument that the process of selling bankrupt companies is broken. Their regressions showed that firm strength, as represented by EBITDA, explained only 13% of the variation in recovery ratios while disposition type explained almost 30%.[91] Furthermore, their regressions showed that even after controlling for EBITDA, reorganized firms on average recovered about 75% of their pre-filing book-asset value while section 363 firms on average recovered a measly 29%.[92] No matter what combination of control variables LoPucki and Doherty included in their regressions, the disparity between average recovery ratios of reorganized firms and section 363 firms remained statistically significant at the .01 level, bespeaking a less than one-in-one-hundred chance that the difference in average recovery ratios was merely a manifestation of randomness in the data.[93] From this evidence, LoPucki and Doherty concluded that the choice between reorganization and sale is a principal determinant of bankruptcy recovery values[94] and by far the most important determinant of bankruptcy recovery ratios.[95]

Section I.C showed that implied market value is more reliable than book-asset value in determining bankruptcy recovery.[96] Section I.D showed not only that book-asset value systematically inflates the implied market value of section 363 firms but also that EBITDA fails to adequately capture that phenomenon.[97] In light of those findings, we must ask whether LoPucki and Doherty's reliance on book-asset value

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[89] *Id.* at 22–29 (noting multiple variables, such as timing and stock market conditions, were used in study).

[90] *Id.* at 22 (explaining dependent variable is "ratio of the recovery to the book value of the debtor's assets"). LoPucki and Doherty calculated recovery value in each sale by adding liabilities assumed by the buyer to consideration paid by the buyer. *Id.* at 20 ("To calculate the recovery from the nominal sale price, we added liabilities assumed by the buyers to the case and other consideration paid by the buyers."). They calculated recovery in each reorganization by adding the fresh-start accounting value of the debtor's liabilities to the market value of the debtor's equity. *Id.* at 20–21 (describing how recovery was calculated).

[91] *Id.* at 24 (finding recovery ratios are best explained by whether company is reorganized or resold and not company earnings).

[92] *Id.* (concluding debtors have substantially higher recovery ratios if they reorganize as opposed to sell).

[93] *Id.* at 23 tbl.1.

[94] *Id.* at 4 ("[Our] findings include a regression model that shows the choice between reorganization and sale to be a principal determinant of the value realized in the bankruptcy of a large public company.").

[95] *Id.* at 31 ("The company's earnings [and other factors] . . . played a role. But the choice between sale and reorganization was by far the most important factor.").

[96] *See supra* I.C.

[97] *See supra* I.D.

and EBITDA has led them to overstate the importance of disposition type in determining bankruptcy recoveries.

To eliminate the systematic bias against section 363 firms that exists when recovery ratios are measured as proportions of book-asset values, I redefine the recovery ratio as the ratio of a firm's recovery value to its pre-bankruptcy implied market value.[98] Like LoPucki and Doherty, I use the natural logarithm of the recovery ratio as the dependent variable in my regressions to prevent outliers from driving the analysis. Choosing the logarithm of the recovery ratio as the dependant variable will prove useful in interpreting the results for the following reason. The logarithms of the recovery ratios are approximately equal to the residuals (plus or minus a constant) generated by a regression in which the logarithm of the recovery value is the dependent variable and the logarithm of the implied market value is the independent variable.[99] As such, the variation in the logarithms of the recovery ratios is approximately equal to the variation in the residuals of that regression.[100] What does that mean in plain English? It means that the dependent variable controls for pre-filing implied market value and the variation of our dependent variable is that fraction of variation in recovery values that could not be explained by pre-filing implied market value.

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[98] Since implied market values could not be calculated for six of the forty-nine firms analyzed by LoPucki and Doherty, the number of cases in the regression drops from forty-nine to forty-three. *See supra* Section I.B.1. To ensure that the deletion of six cases from the sample did not affect the results, I replicated LoPucki and Doherty's regressions on the sample of forty-three cases. None of their findings are affected. In particular, their regressions continue to show that reorganized firms recover about 75% of their book value on average while section 363 firms recover about 29%, and the difference in average recovery ratios is statistically significant at the .01 level no matter what combination of their control variables are included. *See infra* app. C.

[99] The regression of the logarithm of the recovery value on the logarithm of the implied market value is given by $\ln(y_i) = \hat{a} + \hat{B}\ln(x_i) + \hat{\varepsilon}_i$ where y_i is the recovery value in case i, x_i is the implied market value in case i, $\hat{a}$ is the sample intercept, $\hat{B}$ is the sample slope coefficient, and $\hat{\varepsilon}_i$ is the residual value in case i. Algebraic rearrangement of the regression equation gives $\ln(y_i / x_i) = (\hat{B} - 1)\ln(x_i) + \hat{a} + \hat{\varepsilon}_i$. Clearly as the value of $\hat{B}$ moves closer to 1, the logarithm of the recovery ratio, given by ln (y_i / x_i), moves closer to $\hat{a} + \hat{\varepsilon}_i$, which is simply the residual value plus the constant intercept term. *See supra* Section I.C (demonstrating $\hat{B} \approx 1$).

[100] Since $\hat{a}$ is a constant, taking the variance of the recovery ratios in the sample gives us $\underset{i=1}{\overset{i=N}{Var}}\{\ln(y_i / x_i)\} = \underset{i=1}{\overset{i=N}{Var}}\{(\hat{B} - 1)\ln(x_i) + \hat{\varepsilon}_i\}$. Because the error term in a regression is assumed to have zero covariance with the independent variables of the regression, we have $\underset{i=1}{\overset{i=N}{Var}}\{(\hat{B} - 1)\ln(x_i) + \hat{\varepsilon}_i\} = (\hat{B} - 1)^2 \underset{i=1}{\overset{i=N}{Var}}\{\ln(x_i)\} + \underset{i=1}{\overset{i=N}{Var}}\{\hat{\varepsilon}_i\}$. Clearly, as $\hat{B}$ moves closer to 1, the variance of the recovery ratio, which is given by $\underset{i=1}{\overset{i=N}{Var}}\{\ln(y_i / x_i)\}$, moves closer to $\underset{i=1}{\overset{i=N}{Var}}\{\hat{\varepsilon}_i\}$, which is the unexplained variance of the regression of the logarithm of the recovery value on the logarithm of the implied market value. *See id.* (demonstrating $\hat{B} \approx 1$).

Table 2. Determinants of Recovery Ratio (Robust standard errors in parentheses)

Table 2 reports the output of five regressions in which the dependent variable is the logarithm of the ratio of recovery value to pre-bankruptcy implied market value. The total variation in the dependent variable in each regression is approximately equal to the unexplained variation of Model II in Table 1.

	I.	II.	III.	IV.	V.
Sale (0=Reorg, 1=Sale)	-0.691** (0.203)	-0.643** (0.197)	-0.624** (0.185)	-7.778* (3.607)	-6.687† 3.543
EBITDA/Assets		1.821† (0.906)	1.710† (0.913)	1.635* (0.804)	2.253* (0.973)
Industry Distress			0.647 (0.489)	0.790 (0.500)	0.908 (0.554)
Telecom			-0.568† (0.326)	-0.553† (0.302)	-0.576* (0.257)
Days In natural log				-0.169 (0.131)	-0.192† (0.113)
Days In * Sale natural log				0.434† (0.217)	0.368† (0.215)
S&P 500					-0.568 (0.696)
Net Merger residuals					0.229 (0.155)
Constant	-0.339** (0.117)	-0.422** (0.133)	-0.595 (0.226)	2.176 (2.130)	3.077 (2.154)
Total Variation in Dependent Variable	23.5	23.5	23.5	23.5	23.5
R-squared	.22	.29	.38	.45	.49
N	43	43	43	43	43
†p<.10, *p<.05, **p<.01,***p<.001 (two-tailed p-values)					

Following LoPucki and Doherty's example, I specify several regressions using various combinations of control variables in order to ensure that any conclusions drawn are not the result of an aberrational model. The control variables, which all come directly from LoPucki and Doherty's analysis, consist of the following: the firm's EBITDA-to-assets ratio,[101] the fraction of the firm's industry that is in distress, a binary variable indicating whether the firm belonged to the telecommunications industry, the number of days the firm spent in bankruptcy, an interaction of the number of days the firm spent in bankruptcy and its disposition

[101] LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 23 (controlling for earning differences of assets). The results are unchanged if we control for the ratio of EBITDA to implied market value.

type, the closing price of the S&P 500 on the date of disposition, and the number of mergers in the year of disposition net of the level of the S&P 500.[102]

Disposition type, represented by the Sale variable, explains roughly 20% of the variation in recovery ratios.[103] I view that contribution to explained variance with ambivalence. On the one hand, the Sale variable explains more variation in recovery ratios than any of the control variables in the regressions. For instance, EBITDA explains less than 10% of the variation in recovery ratios. On the other hand, we cannot forget that the variation in recovery *ratios* is the portion of variation in recovery *values* left unexplained by implied market value. Implied market value explains 75% of the variation in recovery values, leaving 25% unexplained.[104] The Sale variable then explains 20% *of that unexplained 25%*, which equates to 5% of the total variation in recovery values. Explaining even 5% of the variation in recovery values is far from trivial, given that recovery values varied by billions of dollars in the sample. But, it is puffery to label disposition type a principal determinant of recovery value[105] when implied market value explains fifteen times as much variation in recovery values as disposition type.

The difference between average recovery ratios of reorganized firms and section 363 firms is also open to interpretation. Although the average recovery ratio of reorganized firms still meaningfully exceeds that of section 363 firms, the difference in average recovery ratios identified by LoPucki and Doherty has narrowed by one-third of its original size and its statistical significance has

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[102] *Id.* at 25–29 (detailing each variable). It may seem redundant to control for these factors after having already controlled for implied market value, which theoretically should reflect all information relevant to the value of the firm. To the extent that a particular control variable has been made superfluous by controlling for implied market value within the dependent variable, that control variable will be less significant (or utterly insignificant) in determining the recovery ratio. There are, however, three reasons to believe that the control variables are not superfluous. First, many of the control variables contain information that did not exist on the valuation date. The level of the S&P 500 at the disposition date, the number of mergers in the year of disposition, the fraction of distressed firms in an industry in the year of disposition, and the length of the bankruptcy case were all unknown on the valuation date, as that date preceded the bankruptcy filing by days, weeks or months. Similarly, in some cases, the financial reports from which LoPucki and Doherty retrieved EBITDA had not yet been published by the valuation date. Implied market values could not possibly reflect that information. Second, even if information existed at the valuation date, its relevance may not have been fully appreciable *ex ante* even if it became obvious *ex post*. For instance, telecommunications companies suffered particularly dismal recoveries in the sample, but market participants may not have had comparable past experience with failing telecommunications companies from which to form that expectation and incorporate it into pre-bankruptcy prices. Third, market imperfections (such as irrational speculation) and my own simplifying assumptions (such as the assumption that each firm's asset volatility equals the volatility of comparable firms' assets) undoubtedly added some noise to my calculations of implied market value, which might be corrected by the inclusion of the control variables. For those reasons, the control variables still serve their purpose.

[103] LoPucki and Doherty measure the Sale variable's contribution to explained variance as the increase in R-squared of a regression that already includes EBITDA as an independent variable. *Id.* at 23 tbl.1. Based on that measurement, the Sale variable explains 18% of the variation in recovery ratios. On the other hand, if the Sale variable is the only independent variable in the regression, it explains 22%.

[104] *See supra* tbl.1.

[105] *See* LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 4. ("[Our] findings include a regression model that shows the choice between reorganization and sale to be a principal determinant of the value realized in the bankruptcy of a large public company.").

dwindled. On average, reorganized firms recover about 69% of their pre-bankruptcy implied market values, while firms sold under section 363 recover about 38% of their pre-bankruptcy implied market values.[106] Thus, the forty-six percentage-point difference in average recovery ratios identified by LoPucki and Doherty has narrowed to thirty-one percentage points. In some specifications of the regression model, the difference in average recovery ratios is significant at the .01 level; in other specifications it is significant at only the .05 level; and in a specification that includes all of the control variables tested by LoPucki and Doherty, the difference in average recovery ratios is significant at only the .1 level. Thus, after incorporating implied market values into the regression, I am not nearly as confident as LoPucki and Doherty that the difference in average recovery ratios is more than the offspring of randomness in the sample data. Additional data is needed to increase the precision of the regression results.

II. AN UNRESOLVED METHODOLOGICAL BIAS: ASYMMETRIES IN THE MEASUREMENT OF BANKRUPTCY RECOVERIES

In the previous section, the numerator of the recovery ratio was the recovery value computed by LoPucki and Doherty. In each sale, the recovery value was computed by adding liabilities assumed by the buyer to cash and other consideration paid by the buyer, as listed in the applicable asset purchase agreement.[107] In each reorganization, the recovery value was computed by adding the fresh-start accounting value of the debtor's liabilities to the post-reorganization market value of the debtor's equity; the former amount came from the debtor's first financial statements after the plan's effective date and the latter amount came from public market prices on the first trading day after the plan's effective date.[108]

On the surface, the recovery values so computed appear directly comparable. Whether a firm is reorganized or sold, its recovery value is the implicit value of the firm computed by adding the liabilities that survive bankruptcy to the market value of the firm in excess of its liabilities. What spoils the comparison is that asset

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[106] Depending on the combination of control variables included, these average recovery ratios ranged from 68% to 71% for reorganized firms and ranged from 36% to 40% for firms that were sold.

[107] *Id.* at 19 (indicating purchase agreement was principal data source).

[108] *Id.* at 20–21 (indicating fresh-start value was calculated "from the companies postconfirmation financial statements contained in the annual reports filed with the Securities Exchange Commission"). LoPucki and Doherty also computed the recovery value by adding the fresh-start accounting value of the debtor's liabilities and the fresh-start accounting value of the debtor's equity, which equals the fresh-start value of the debtor's assets. *Id.* Anticipating that readers might be critical of fresh-start accounting values, LoPucki and Doherty report only regression results obtained using recovery values computed from market equity values. *Id.* The measurement problems addressed in this section would exist under either approach because the asymmetries in liability recognition discussed in this section are paralleled by asymmetries in asset recognition. The recognition of leased assets and lease liabilities is a principal example of how asset recognition in financial statements parallels liability recognition. *See generally* ACCOUNTING FOR LEASES, Statement of Fin. Accounting Standards No. 13 (Fin. Accounting Standards Bd. 1980) [hereinafter SFAS 13].

purchase agreements don't always recognize the same liabilities as fresh-start financial statements would in an economically identical transaction.

The recognition of liabilities in financial statements is governed by Generally Accepted Accounting Principles ("GAAP"). Liabilities reported on financial statements prepared in conformance with GAAP are not always intuitive and include such head-scratchers as payments owed from customers in excess of recognizable revenues on long-term construction contracts,[109] payments received from customers for services (or even forbearances) that have not been substantially completed,[110] and the present value of minimum payments owed to lessors on capital (but not operating) leases.[111] In contrast, the recognition of liabilities in an asset purchase agreement is governed only by the exigencies of the transaction[112] and should unambiguously express the intent of the parties as to which obligations each will fulfill.[113] If financial statements systematically recognize more liabilities than asset purchase agreements in economically identical transactions, then reorganizations will appear to generate higher recovery values than section 363 sales even when the economics of the transactions are the same.[114]

To test the hypothesis that the recovery values of section 363 firms have been understated due to systematic differences in liability recognition, we need to know what the recovery values of the 363 firms would have been if those values had been computed from liabilities recognized in conformance with GAAP.[115] Fortunately, the acquirers' financial statements in the year of the acquisition can fulfill this counterfactual. Unfortunately, out of the twenty-two sale cases included in the previous section's regression analysis, only nine involved acquirers who published financial statements accounting for the transaction.[116]

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[109] *See* LONG-TERM CONSTRUCTION-TYPE CONTRACTS, Accounting Research & Terminology Bulletin No. 45, ¶ 5 (Am. Inst. of Certified Pub. Accountants 1955) [hereinafter ARB 45].

[110] *See* SAB 101, *supra* note 62 (acknowledging revenue is realizable when performance or delivery is substantially complete).

[111] In general, capital leases are distinguished from operating leases in that the former transfer ownership of the asset to the lessee at the end of the lease term, contain a bargain purchase option, extend for over 75% of the life of the leased asset, or require lease payments the present value of which exceeds 90% of the leased asset. *See* SFAS 13, *supra* note 108 (defining criteria for classifying leases).

[112] *See* MODEL ASSET PURCHASE AGREEMENT xiv (American Bar Association ed. 2001) (explaining "[n]o form of acquisition agreement is 'standard' or suitable for all transactions, and every provision in the Model Agreement is subject to change reflecting the facts and circumstances of the particular transaction").

[113] *See id.* at 49 (stating "[a]s to approach, most buyers will desire to identify the liabilities they will assume with as much specificity as practicable to reduce the chance for unanticipated exposure and controversy").

[114] This follows from the fact that recovery value is computed as the sum of (recognized) liabilities and the market value of the residual interest in the firm.

[115] Alternatively, it would be sufficient to know what the recovery values of reorganized firms would have been if they had been computed from liabilities reported in asset purchase agreements, but the absence of a standard for reporting liabilities in asset purchase agreements forecloses that approach.

[116] These nine cases were: *In re* Bethlehem Steel Corp., 390 B.R. 784 (Bankr. S.D.N.Y. 2008) (acquired by International Steel Group, Inc.); *In re* IT Grp., Inc., 377 B.R. 471 (Bankr. D. Del. 2007) (acquired by Shaw Group Inc.); *In re* Weirton Steel Corp., No. 03-1802, 2007 WL 2021896 (Bankr. N.D. W. Va. 2007) (acquired by International Steel Group, Inc.); *In re* Allegiance Telecom, Inc., 356 B.R. 93, 96 (Bankr. S.D.N.Y. 2006) (acquired by XO Communication, Inc.); *In re* Nat'l Steel Corp., 321 B.R. 901 (Bankr. N.D.

For the nine transactions that were described in the acquirers' published financial statements, I compute the GAAP recovery value as the sum of (i) cash and securities paid by the buyer and (ii) liabilities specified by the buyer as being transferred onto its balance sheet from the debtor's balance sheet. In keeping with the methodology employed by LoPucki and Doherty, the GAAP recovery values were reduced by DIP lending received but not returned to creditors.[117]

Table 3: Comparison of valuations computed from asset purchase agreements and valuations computed from the acquirers' GAAP financial statements for nine companies sold under section 363.

Company Name	Asset Purchase Agreement Valuation	GAAP Valuation by Acquirer	Ratio
Genuity	137,000,000	425,000,000	3.10
IT Group	155,973,000	477,400,000	3.06
Bethlehem Steel	1,297,362,635	1,845,000,000	1.42
Allegiance Telecom	492,000,000	636,600,000	1.29
National Steel	1,050,000,000	1,269,000,000	1.21
Budget Group	3,529,300,000	3,936,000,000	1.12
Weirton Steel	237,500,000	255,000,000	1.07
Einstein Noah Bagel	209,100,000	221,577,000	1.06
Casual Male	221,769,975	211,000,000	0.95

In eight of the nine sales, the GAAP recovery value exceeds the value computed from the asset purchase agreement by LoPucki and Doherty (Table 3). On average, the GAAP valuations are 1.6 times as large as the valuations in the respective asset purchase agreements. When the data are expressed in logarithmic form to reduce the influence of extreme cases, the GAAP valuations are 1.4 times as large as the asset purchase agreement valuations on average. This disparity between GAAP valuations and asset purchase agreement valuations is large enough to establish statistical significance notwithstanding the small sample size.[118]

The two cases with the largest ratios of GAAP valuation to asset purchase agreement valuation exemplify the asymmetries in liability measurement. The

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Ill. 2005) (acquired by US Steel Corp.); *In re* Genuity Inc., 323 B.R. 79 (Bankr. S.D.N.Y. 2005) (acquired by Level 3 Communications); *In re* Casual Male Corp., 317 B.R. 472 (Bankr. S.D.N.Y. 2004) (acquired by Designs, Inc.); *In re* Brac Grp., Inc., No. 02-12152, 2004 WL 1749185 (Bankr. D. Del. 2004) (acquired by Cendant Corp.); *In re* Einstein/Noah Bagel Corp., 257 B.R. 499 (Bankr. D. Ariz. 2000) (acquired by New World Coffee-Manhattan Bagel, Inc.).

[117] *See* LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 21 ("We adjusted both of these [exit] values to reflect only the assets owned when the debtor filed Exhibit A at the commencement of the bankruptcy case. Those adjustments included adding to reorganization value any substantial amounts paid to creditors during the bankruptcy case and subtracting from reorganization value any substantial amounts borrowed during the bankruptcy case as DIP lending or exit financing. Such payments and borrowings were usually reflected in the companies' disclosure statements or later financial statements." (footnote omitted)).

[118] I applied a t-test to determine whether the logarithm of the GAAP valuation minus the logarithm of the asset purchase agreement valuation was significantly different from zero. It was, with p=.02.

largest ratio belongs to Genuity. On the basis of the asset purchase agreement, LoPucki and Doherty report that Level 3 Communications ("Level 3") acquired Genuity in a $137 million all-cash deal.[119] Although the asset purchase agreement mentions the assumption of leases, nowhere does it quantify the $309 million in present value of future capital lease payments as a liability assumed by Level 3 Communications.[120] This explains why LoPucki and Doherty didn't count the capital lease obligation in computing Genuity's recovery value. Of course, Level 3 reported the capital lease obligation as a liability on its subsequent balance sheet in conformance with GAAP.[121] Likewise, Genuity would have reported the capital lease obligation as a liability in its fresh-start financial statements had it been reorganized rather than sold.[122]

The second largest ratio of GAAP valuation to asset purchase agreement valuation belongs to the IT Group. Here, the GAAP valuation includes a particularly strange liability: billings in excess of costs and recognized profits. In GAAP financial statements, this liability arises in the context of long-term construction contracts using the percentage-of-completion method.[123] Under the percentage-of-completion method, firms recognize revenue (equal to cost plus profit) formulaically over the life of a contract.[124] Notwithstanding this method of revenue recognition, a firm will bill its clients and thereby create accounts receivable, according to whatever schedule is acceptable to the firm and the clients. If accounts receivable generated by billings were allowed to exceed the revenue recognizable under the percentage-of-completion method, then assets would exceed liabilities plus equity on the balance sheet. Such a result is anathema to the accounting profession. So, to bring the balance sheet back into balance, accountants create a "liability" dubbed billings in excess of costs and recognized profits.[125] Of course, no one acquiring a company would list this as a liability assumed in an asset purchase agreement, as it is more akin to a placeholder for future receipts. When IT Group, Inc. ("IT Group") was acquired by The Shaw

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[119] *See id.* at 52 app. B, 57 app. C-I.

[120] *See* Level 3 Commc'n Inc., Asset Purchase Agreement (Form 8-k) (Nov. 27, 2002); *see also* Level 3 Commc'n Inc., Asset Purchase Agreement (Form 8-k) (Feb. 2, 2003).

[121] *See* Level 3 Commc'n, Inc., Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 (Form 10-K), at F-7 (Mar. 15, 2004) (reporting capital leases assumed under Genuity transaction).

[122] Liabilities in fresh-start financial statements are listed at the present value of amounts to be paid. *See* LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 7 & n.18 ("The most common method of valuation employed in reorganization cases is to 'discount[] future cash flows for the reconstituted business that will emerge from Chapter 11 . . . at rates reflecting the business and financial risks involved.'" (citation omitted)). A capital lease obligation is a liability under GAAP. *See* SFAS 13, *supra* note 108, at ¶ 13 (mandating assets recorded in capital leases must be identified in balance sheet).

[123] *See* ARB 45, *supra* note 109, at ¶ 5 (indicating current liabilities include recognized income from other contracts and excess billings).

[124] *See id.* at ¶¶ 4–8 (indicating percentage-of-completion method relies heavily on cost estimates and income but there can be uncertainty because long-term contracts are not always predictable).

[125] *See id.* at ¶ 5 (noting liabilities "may include billings in excess of costs and recognized income with respect to other contracts").

Group ("Shaw Group"), over $300 million of IT Group's operating liabilities were moved onto the Shaw Group's balance sheet, including approximately $150 million of contract related accruals such as billings in excess of costs and recognized profits.[126] LoPucki and Doherty found none of these liabilities in the asset purchase agreement, resulting in a valuation several times smaller than the valuation derived from the acquirer's GAAP financial statements.[127]

The foregoing evidence suggests that the recovery values computed by LoPucki and Doherty, which were the numerators of the recovery ratios in their analysis and mine, understate the recoveries of section 363 firms relative to those of reorganized firms due to systematic differences in liability recognition. Future studies might eliminate this methodological bias by identifying more section 363 sales for which acquirers' published GAAP valuations or by employing imputation techniques to predict GAAP valuations in cases missing them. For now at least, the heavy conclusion that disposition type is a significant determinant of bankruptcy recovery stands on wobbly legs.

CONCLUSION

In *Bankruptcy Fire Sales*, LoPucki and Doherty argued that bankruptcy courts were selling firms for less than half of their reorganization value to line the pockets of repeat players.[128] The lynchpin of their argument was a regression analysis showing that even after controlling for earnings and pre-filing book assets, firms sold as going-concerns generally recovered less than half as much value as reorganized firms, with a high degree of statistical significance.

This Article has shown that the difference in average recovery ratios identified by LoPucki and Doherty is in part attributable to the weakness of the section 363 firms at the outset of bankruptcy. When bankruptcy recoveries are measured as proportions of the pre-bankruptcy market value implied by an options model, the difference in average recovery ratios narrows and its statistical significance falls into doubt. The remaining difference in average recovery ratios appears to result in large part from asymmetries in the measurement of bankruptcy recoveries.

In light of these findings, there is not adequate evidence to reject the law-and-economics hypothesis that going-concern sales preserve as much value as reorganizations. Accordingly, LoPucki and Doherty's claim that bankruptcy courts have failed to fulfill their obligation of maximizing debtors' estates by allowing section 363 sales lacks empirical substantiation.

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[126] *See* Shaw Group Inc., Annual Report Pursuant to Section 13 or 15(d) of the Securities Exchange Act of 1934 (Form 10-K), at 84–85 (Nov. 12, 2003) (emphasizing company acquired "substantially all of the operating assets and assumed certain liabilities of The IT Group, Inc. and its subsidiaries").

[127] *Compare id.* (listing assets of $477 million and, equivalently, liabilities assumed plus cash purchase price of $477 million), *with* LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 47 app. A-1 (valuing transaction at $156 million).

[128] *See* LoPucki & Doherty, *Fire Sales*, *supra* note 5, at 44–45 (concluding many companies preferred going-concern sales over reorganization).

Appendix A: Options-Pricing Model

$$E_0 = V_0 M(a_1, b_1; \sqrt{T_1/T_2}) - K_2 e^{-rT_2} M(a_2, b_2; \sqrt{T_1/T_2}) - e^{-rT_1} K_1 N(a_2)$$

where

$$a_1 = \frac{\ln(V_0/V^*) + (r + \sigma^2/2)T_1}{\sigma\sqrt{T_1}}, a_2 = a_1 - \sigma\sqrt{T_1}$$

$$b_1 = \frac{\ln(V_0/K_2) + (r + \sigma^2/2)T_2}{\sigma\sqrt{T_2}}, b_2 = b_1 - \sigma\sqrt{T_2}$$

where

E_0 is the value of equity at the valuation date,

V_0 is the value of the firm's assets at the valuation date,

V^* is the value of the firm at the maturity date of the current obligations such that the value of equity at that date equals the amount of current obligations due,

K_1 and K_2 are the scheduled payments of current obligations and long-term obligations, respectively,

T_1 and T_2 are the maturity dates of the current and long-term obligations, respectively,

σ is the volatility of the firm's assets,

r is the risk free rate,

$N(\cdot)$ is a cumulative univariate normal distribution function, and

$M(\cdot)$ is a cumulative multivariate normal distribution function.

Appendix B.1: Options-Pricing Model Data
Reorganization Cases

	Equity Value (000's)	Current Obligations (000's)	Long-term Obligations (000's)	Maturity of Current Obligations (years)	Maturity of Long-term Obligations (years)	Risk Free Rate (annual)	Asset Volatility (annual)	Implied Market Value of Assets (000's)
AMF Bowling, Inc.	$19,594	$157,565	$2,120,084	0.08	7.6	5.70%	29%	$909,469
Arch Wireless Inc.	$66,940	$314,163	$2,495,332	0.08	4.5	4.90%	60%	$1,118,234
Chart Industries Inc.	$6,311	$111,639	$329,523	0.08	2.4	2.89%	24%	$393,362
Conseco, Inc.	$118,750	$47,252,000	$5,964,000	0.08	2.4	3.35%	10%	$51,197,857
DDI Corp.	$4,354	$83,185	$346,685	0.08	3.7	3.02%	48%	$251,713
Exide Techs.	$11,000	$757,676	$2,115,282	0.08	3.5	4.35%	61%	$1,450,457
GenTek, Inc.	$6,837	$229,561	$1,542,159	0.08	3.5	4.68%	39%	$973,885
NRG Energy, Inc. (2003)	$2,106,103	$3,492,100	$13,115,940	0.08	6.7	4.35%	10%	$15,320,637
Polymer Group, Inc.	$17,282	$100,440	$1,508,035	0.08	4.0	4.46%	23%	$1,024,444
Redback Networks Inc.	$113,465	$83,872	$640,324	0.08	3.4	2.84%	59%	$522,106
SpectraSite Holdings, Inc.	$33,884	$116,633	$4,799,138	0.08	5.4	3.00%	44%	$1,304,983
Sterling Chemicals Holdings, Inc.	$23,462	$177,679	$1,674,650	0.08	5.1	5.66%	28%	$1,037,602
Sun HealthCare Group, Inc.	$22,819	$464,334	$2,829,000	0.08	5.0	5.66%	21%	$2,207,725
Sunterra Corp.	$12,367	$291,936	$926,554	0.08	6.4	6.54%	24%	$797,704
Superior Telecom, Inc.	$6,408	$426,843	$1,671,259	0.08	2.8	3.98%	38%	$1,405,007
Tokheim Corp. (2000)	$12,670	$183,515	$704,422	0.08	4.9	6.15%	30%	$587,482
US Airways, Inc. (2002)	$166,743	$2,977,000	$8,730,000	0.08	4.1	3.28%	35%	$8,631,774
Vencor, Inc.	$44,016	$469,519	$1,353,401	0.08	4.8	5.75%	22%	$1,442,998
Vista Eyecare, Inc.	$15,885	$66,418	$216,518	0.08	4.4	6.16%	43%	$197,244
Williams Comm. Group, Inc.	$63,792	$809,277	$8,373,005	0.08	4.9	4.25%	52%	$3,184,282
XO Comm., Inc.	$448,011	$855,368	$10,481,064	0.08	5.8	4.33%	28%	$6,670,304

Appendix B.2: Options-Pricing Model Data
Sales Cases

	Equity Value (000's)	Current Obligations (000's)	Long-term Obligations (000's)	Maturity of Current Obligations (years)	Maturity of Long-term Obligations (years)	Risk Free Rate (annual)	Asset Volatility (annual)	Implied Market Value of Assets (000's)
ABC-NACO, Inc.	$2,782	$105,075	$314,525	0.08	2.0	4.01%	62%	$253,623
Allegiance Telecom Inc.	$44,171	$771,673	$1,086,000	0.08	3.7	2.90%	41%	$1,544,051
ANC Rental Corp.	$27,127	$1,442,000	$5,260,000	0.08	2.2	3.69%	21%	$5,702,734
Asia Global Crossing, Ltd.	$209,500	$429,867	$1,563,642	0.08	5.4	4.26%	51%	$1,350,232
Bethlehem Steel Corp.	$156,276	$797,000	$3,864,000	0.08	3.4	4.10%	30%	$3,664,493
Budget Group Inc.	$10,804	$2,420,963	$2,412,646	0.08	2.3	4.90%	14%	$4,366,826
Casual Male Corp.	$9,708	$92,005	$202,793	0.08	2.0	4.95%	51%	$237,802
Coho Energy, Inc. (2002)	$9,918	$17,426	$418,525	0.08	2.9	3.14%	33%	$266,876
Cone Mills Corp.	$28,016	$111,910	$143,359	0.08	1.7	3.12%	29%	$273,485
Divine, Inc.	$2,343	$204,355	$135,019	0.08	3.2	2.80%	67%	$235,528
Einstein Noah Bagel Corp.	$15,977	$56,443	$177,048	0.08	4.0	6.60%	33%	$187,103
Genuity Inc.	$5,245	$632,556	$3,617,776	0.08	3.0	3.26%	77%	$1,308,016
Grand Union (2000)	$7,498	$163,761	$856,431	0.08	4.7	6.15%	30%	$617,068
Int'l Fibercom, Inc.	$3,496	$69,458	$112,982	0.08	1.4	4.36%	51%	$152,245
IT Group, Inc.	$8,349	$348,506	$1,020,630	0.08	4.4	4.55%	33%	$944,743
Kellstrom	$1,190	$264,314	$199,773	0.08	2.0	4.55%	21%	$411,511
National Steel Corp.	$42,423	$715,000	$2,137,000	0.08	3.9	4.40%	28%	$2,242,292
Network Plus Corp.	$15,106	$210,030	$151,128	0.08	2.9	4.30%	52%	$322,137
Polaroid Corp	$13,399	$901,600	$930,848	0.08	4.1	3.96%	58%	$1,234,836
Rouge Industries, Inc.	$10,710	$285,676	$263,800	0.08	2.4	3.12%	28%	$515,021
U.S. Aggregates, Inc.	$2,086	$64,850	$260,730	0.08	3.6	4.40%	37%	$211,179
Weirton Steel Corp.	$9,430	$259,000	$1,199,000	0.08	4.1	2.91%	29%	$1,041,211

Appendix C: Regression Comparison

The first table below reports LoPucki and Doherty's regression results as presented in *Bankruptcy Fire Sales*, where the sample size was forty-nine cases. The second table shows that the results are virtually identical when the sample is restricted to the forty-three cases analyzed in this Article.

N=49	I.	II.	III.	IV.	V.
EBITDA/Assets natural log	2.805* (1.104)	2.208* (0.922)	2.164* (0.840)	2.813** (0.981)	3.007** (0.948)
Sale (0=Reorg, 1=Sale)		**-0.897*** (0.190)**	**-10.497** (3.462)**	**-9.115** (3.130)**	**-9.685** (2.896)**
Days In natural log			-0.280* (0.114)	-0.299** (0.100)	-0.366*** (0.088)
Days In * Sale natural log			0.580** (0.205)	0.495* (0.186)	0.528** (0.173)
S&P 500				-0.324 (0.566)	-0.601 (0.555)
Net Merger residuals				0.309* (0.144)	0.332* (0.158)
Industry Interest Coverage					0.841† (0.485)
Telecom					-0.615* (0.252)
Constant	0.894*** (0.122)	0.400** (0.147)	4.298* (1.954)	4.934* (2.028)	6.094** (1.780)
Total Variation in Dependent Variable	33.8	33.8	33.8	33.8	33.8
R-squared	.13	.41	.50	.55	.63

N=43	I.	II.	III.	IV.	V.
EBITDA/Assets natural log	2.635* (1.175)	2.162* (0.963)	2.158* (0.865)	2.801** (1.025)	2.923** (1.011)
Sale (0=Reorg, 1=Sale)		**-0.892*** (0.212)**	**-11.843** (3.687)**	**-10.293** (3.348)**	**-10.420** (3.179)**
Days In natural log			-0.338** (0.115)	-0.353** (0.994)	-0.391*** (0.096)
Days In * Sale natural log			0.662** (0.219)	0.566** (0.199)	0.576** (0.190)
S&P 500				-0.308 (0.620)	-0.472 (0.582)
Net Merger residuals				0.315* (0.149)	0.343* (0.165)
Industry Interest Coverage					0.869† (0.511)
Telecom					-.607* (0.280)
Constant	-0.847*** (0.137)	-0.376* (0.159)	5.277* (1.968)	5.845** (2.118)	6.373** (1.959)
Total Variation in Dependent Variable	31.4	31.4	31.4	31.4	31.4
R-squared	.12	.39	.50	.55	.63