Performance of Distressed Bonds

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Distressed debt is an asset class composed of bonds, loans, and other claims that are either in default or at substantial risk of default as indicated by market valuations. Over the past decade and a half, managing portfolios of distressed debt for institutions and high-net-worth individuals has developed into a distinct and growing specialty within the fixed-income business. Altman and Hotchkiss [2006] estimated the amount of total funds under distressed securities management at $150 billion, up from $10 billion in 1992, and the number of money managers who specialize in distressed debt at 150 in the U.S. and 22 in Europe.

Despite distressed debt's increasing prominence on the investment scene, little research has been devoted to strategies for active portfolio management in the asset class. Consistent with practitioners' primary focus on security selection, books such as those by Moyer [2005], and Owlsey and Kaufman [2005] have concentrated on credit analysis and valuation at the individual bond level. They have particularly emphasized the role of bankruptcy law in these activities.

In one early extension of distressed debt research into broader portfolio management issues, Fridson and Gao [2002] assessed the market's accuracy in valuing the difference between a senior position and a subordinated position in a defaulted bond. Altman and Hotchkiss [2006] also expanded the discussion of active portfolio management by addressing topics such as bankruptcy prediction, recovery rates on defaulted bonds, comparative investment merits of distressed bonds and distressed loans, and capital structure arbitrage, which is the attempt to capitalize on temporary relative value anomalies among bonds of a single issuer.

The objective of the study presented in this article is to expand the empirical basis for active management of distressed debt portfolios. Specifically, we investigate risk and reward within the population of distressed issues. Our analysis focuses on the distressed debt universe's nondefaulted bond segment, hereafter referred to simply as *distressed*. The study consists of two parts, each of which documents a key aspect of the risk-reward ratio within this market segment.

The first part of the study quantifies the historical, one-year default probability on distressed debt. Here, we define the distressed universe by the criterion of an option-adjusted spread (OAS) greater than 1,000 basis points (bps).[1] For comparison, we also calculate the one-year default probability on non-distressed debt. Inter alia, our analysis demonstrates that contrary to the conclusions of a widely cited 1958 study of corporate bond default rates, market ratings (spreads over Treasuries) provide information that is independent of the default risk information provided by agency ratings.

The second part of the study addresses a classic question in the speculative-grade bond

market: If a bond falls to a specified price, is it better to continue to hold the bond, provided a turnaround appears possible, or to follow a hard and fast rule to sell? We study the question in terms of subsequent price performance. In addition, we calculate the frequency with which bonds falling below the specified price continue to deteriorate and ultimately default. This analysis sheds light on the comparability of a distressed universe defined by price with one defined by spread. Our chosen cutoff price is 70, a threshold sometimes used as an alternative to the 1,000 bps spread for defining the distressed universe. A by-product of this analysis, the documentation of an extremely strong correlation between starting price and total return, is potentially useful in selecting superior distressed debt portfolios.

DEFAULT PROBABILITY

Motivation for Analysis

Probability of default is a key consideration in the evaluation of corporate debt. In addition to their own analyses of issuers' financial statements and operating characteristics, investors traditionally have considered two other measures of default probability. Hickman [1958] wrote:

> The most popular measures of prospective bond quality are the ratings assigned by the four investment agencies: Moody's, Fitch, Standard Statistics, and Poor's (the latter two were merged in 1941 and issued a single rating thereafter).... The market place also, through its daily quotations, is continuously engaged in the process of ranking corporate bonds in order of prospective quality. The market rating used to reflect this ranking is simply the yield spread... (pp. 4–5).

Sources such as Altman with Ramayanam [2007]; Hamilton [2007]; Vazza [2007], and Verde [2007] extensively documented historical default rates by agency rating. Default rates by market rating (yield spread) are less widely reported.

Hickman [1958] defined the yield spread as the difference between an issue's yield and the average yield on the highest quality corporate bonds of the same maturity, essentially those rated triple A. The author merely segmented his sample into two categories—less than 100 bps and 100 bps or more versus triple-A corporates—and confirmed that over the period from 1900 to 1943 default rates were consistently higher in the latter category. He commented that "[l]ike the investment agencies and the legal lists, the market has exhibited a remarkable ability to rank issues in order of the risk of future default" (p. 326).[2]

Distressed debt investors have a particular interest in default probabilities within the segment of the corporate universe in which they specialize. For this portion of the study, we use the previously mentioned definition of the distressed debt universe as bonds with option-adjusted spreads greater than 1,000 bps. (Since Hickman's time, the industry convention for measuring risk premiums on corporate bonds has shifted from using triple-A corporates as the benchmark to a comparison with Treasuries which are free of default risk.) Analysis of a statistically satisfactory sample of distressed bonds has become feasible in recent years, thanks to an expanded functionality of corporate bond indexes.

Analysis

Our initial sample consists of all bonds in the Merrill Lynch High Yield Distressed Index (H0DI)[3] during our observation period. The Distressed Index, a subset of the Merrill Lynch High Yield Master II Index (H0A0), consists of all bonds with option-adjusted spreads greater than 1,000 bps. The Master II Index includes nondefaulted U.S. corporate bonds rated lower than triple B. It excludes convertible bonds and issues of less than $100 million outstanding or less than one year remaining to maturity. The Distressed Index's inception date is December 31, 1996.

Our unit of account in this portion of the study is the issuer. That is, a company with two issues in H0DI counts as a single observation. To limit multiple representations of issuers that remain distressed over extended periods, we test alternating years within the available observation period. Our final samples are collected for the months of January 1997, 1999, 2001, 2003, and 2005.[4] This selection procedure yields a total of 783 observations.

Default is defined as the failure to make a scheduled interest or principal payment, a downgrade to a D rating, or a bankruptcy filing by the issuer. We do not count technical defaults (i.e., violations of covenanted financial tests that do not result in acceleration by creditors).

For comparison, we calculate the default rate for non-distressed issuers. Our initial sample consists of all bonds in the Merrill Lynch High Yield Non-Distressed Index (H0ND) and we follow procedures analogous to those employed in our distressed analysis. The process yields a total of 2,851 observations.

Results

The overall one-year default rate for distressed issuers is 21.58%, as shown in Exhibit 1. Annual rates vary from a low of 13.56% in 2003 to a high of 32.97% in 1999. The only recessionary year within the sample, 2001, produced a distressed default rate of 26.17% which is somewhat above the median (23.53%). Data limitations, however, prevent us from establishing definitive statistical connections between a given year's distressed default rate and standard economic indicators.

For non-distressed issuers the overall one-year default rate is 1.05%, as shown in Exhibit 2. Annual rates vary from a low of 0.56% in 2003 to a high of 1.44% in 2001. A key finding is that distressed issuers default at more than 20 times the rate of non-distressed issuers. Clearly, the speculative grade universe is far from an undifferentiated mass.

It is reasonable to conjecture that clear gradations of default probability exist within the population of distressed issuers. That is, among the issuers with spreads greater than 1,000 bps, default risk could be more pronounced in the wider range, say, spreads greater than 2,000 bps. Our analysis finds no such effect, however. Evidently, the market is adept at identifying high-risk issuers but not at recognizing gradations within the high-risk zone.

Exhibit 3 combines the data for distressed and non-distressed default rates. With a total of 3,634 observations, we find an overall one-year default rate for all high-yield issuers of 5.48%. Year by year, and for the full sample of observations, the rates closely resemble the rates reported by Moody's on a somewhat different universe of speculative grade issuers.[5] Our five selected years produce an overall default rate fractionally higher than the 4.76% mean rate reported by Moody's for the period from 1983 to 2007.[6]

The Value of Market Ratings

Hickman [1958] highlighted comparisons between agency ratings and market ratings. He found that the two types of risk indicators perform similarly. Both classification methods successfully segment the issuer universe by default probability and display a similar micro-level tendency to overrate railroads. It might be inferred from Hickman's findings that market ratings add little or no information not provided by agency ratings.

Our results more strongly point to independent value in market ratings. We observe that the 21.58% annual default rate of distressed issuers is 63% higher than the 13.22% default rate of issuers rated in the lowest Moody's categories (Caa, Ca, and C) over the period from 1982 to 2006. In fact, the probability of default within one year of distressed issuers is higher than the probability of default

EXHIBIT 1
One-Year Default Rate for Distressed Issuers

Year	Number	Defaults	Default Rate
1997	26	6	23.08%
1999	91	30	32.97%
2001	298	78	26.17%
2003	317	43	13.56%
2005	51	12	23.53%
Total	**783**	**169**	**21.58%***

* *Mean of the five annual rates.*

Sources: Edward I. Altman, Merrill Lynch & Co.

EXHIBIT 2
One-Year Default Rate for Non-Distressed Issuers

Year	Number	Defaults	Default Rate
1997	473	3	0.63%
1999	532	7	1.32%
2001	417	6	1.44%
2003	535	3	0.56%
2005	894	11	1.23%
Total	**2,851**	**30**	**1.05%***

* *Mean of the five annual rates.*

Sources: Edward I. Altman, Merrill Lynch & Co.

EXHIBIT 3
One-Year Default Rate—All U.S. High-Yield Issuers

Year	Number	Defaults	Default Rate	Moody's Reported Rate
1997	499	9	1.80%	2.16%
1999	623	37	5.94%	5.81%
2001	715	84	11.75%	11.11%
2003	852	46	5.40%	5.41%
2005	945	23	2.43%	2.10%
Total	**3,634**	**199**	**5.48%***	**5.32%***

* *Mean of the five annual rates.*

Sources: Edward I. Altman, Merrill Lynch & Co., Moody's Investors Service.

within two years of Caa to C issuers (20.89%).[7] These figures demonstrate that market ratings add information for investors by isolating a very high default-risk category that cannot be identified solely on the basis of agency ratings.

PRICE PERFORMANCE

Motivation for Analysis

A classic conundrum for investors in a variety of asset classes is the wisdom of using a fixed rule to limit losses. Doing so sacrifices the potential upside, but may avoid losses arising from the Cockroach Theory. This piece of market lore states that initial bad news about an issuer is invariably followed by more bad news. The name alludes to the notion that the sighting of a single cockroach constitutes reliable evidence that more are present.

Among investors in non-distressed speculative grade debt,[8] the debate about the merits of automatic loss-cutting arises in connection with bonds that fall below a chosen price threshold, which may be as high as 90. For our analysis, we set the threshold at a level commonly used to define the upper bound of the distressed universe. Structuring the analysis in this way enables us to tackle simultaneously a question of interest to distressed investors: Is there a connection between initial price (at the point of entry into the distressed universe) and subsequent return? A distressed investor may be able to achieve superior results by overweighting issues quoted at substantial discounts.

The practice of defining the distressed universe by price is well attested. For example, Pearlman [2003] wrote that "while there's no strict definition for 'distressed,' a good gauge is when the debt has fallen in value to less than 80 cents on the dollar." We choose a cutoff of 70, which is more consistent with the standard option-adjusted spread criterion of greater than 1,000 bps.[9] Because our initial sample includes only distressed issues, our analysis excludes bonds that are non-distressed based on OAS, yet quoted at 70 or below as a function of a long maturity or coupon substantially below prevailing speculative-grade yields.

We first quantify one-year price change and default incidence as a function of beginning price with particular focus on issues at or just below the distressed-category cutoff of 70. We then proceed to the more general question of total return by beginning price. Note that even though some bonds in our sample are priced near par, our analysis deals only with issues in the distressed category, as determined by OAS. A substantial minority of distressed issues (35.0% of the observations in our sample) are quoted above 70, typically reflecting comparatively high coupons and short maturities.

Sample

The unit of account in this portion of the study is issue, meaning that the results are not perfectly comparable to the results of studies that measure default rates or performance by issuers (as in the first part of the study) or dollar amounts. Our sample includes all bonds in the Merrill Lynch U.S. High Yield Distressed Index (H0DI) for selected years. The Distressed Index, or H0DI, consists of all issues within the U.S. High Yield Master II Index (H0A0) with option-adjusted spreads greater than 1,000 bps.

From H0DI's inception on December 31, 1996, we collect the defined sample for the alternating years examined in the first part of this study (i.e., 1997, 1999, 2001, 2003, and 2005). This alternation limits potential distortion from a multiple counting of individual issues that remain in the distressed category for more than one year. Each observation, however, consists of one bond in one year, notwithstanding the possibility that a given bond may be included in the sample in another year.

Results

Exhibit 4 analyzes the one-year price and credit performance of distressed issues that begin the year close to our threshold (i.e., in a price range of 65 to 70, inclusive). Over the five years of observation, the number of issues satisfying that test is 150. To maintain satisfactory subsample sizes, we stratify the ending prices by quintiles.

Considering the question simply in terms of subsequent price performance, the middle section of the exhibit supports the view that non-distressed investors should not automatically dump a bond if it falls into the 65 to 70 price range. Fully 63.33% of distressed issues observed in that range are quoted higher one year later. With 5.33% holding steady in the 65 to 70 range, just 31.33% are quoted below 65 after one year. The breakdown in the top section of the exhibit shows that slightly more than half (52%) of the issues finish at prices higher than 80, while less than one out of six (14.67%) finish below 40.

Variations in default-risk tolerance also enter into the picture. The lower section of the exhibit indicates that

EXHIBIT 4

Distribution of Prices after One Year for Bonds Quoted at 65 to 70, Inclusive

Distressed Debt Index Members—January 1997, 1999, 2001, 2003, 2005

Ending Price*	Probability	Count
0.001-20	7.33%	11
20.001-40	7.33%	11
40.001-60	12.67%	19
60.001-80	20.67%	31
80.001-100+	52.00%	78
0.001-64.999	31.33%	47
65.000-70.000	5.33%	8
70.001-100+	63.33%	95
Total Count		150
Defaulted Count		33
Default Probability		22.00%

* *Price at the later of one year after initial observation or last date of inclusion in Master II Index.*

Sources: Bloomberg, Merrill Lynch & Co.

22% of distressed issues quoted at a price from 65 to 70 default within one year. For many non-distressed investors, the price upside in bonds trading at the distressed threshold does not offset their high default risk.

Another finding of note is the consistency of the distressed default rate under alternative definitions. The 22% issue-denominated default rate is essentially identical to the 21.58% issuer default rate reported in the first part of the study for a distressed universe defined by OAS rather than price. This implies that spread-based and price-based thresholds are equally satisfactory criteria for defining the distressed universe.

Distressed investors approach the question of potential reward versus risk of default differently than do non-distressed investors. They often seek to buy at levels low enough, relative to expected recovery in the event of bankruptcy, that they can be indifferent to whether the bond defaults or not. For them, the bottom line is total return on a portfolio of bonds consciously selected for its high risk of default.

Exhibit 5 analyzes total returns on all 1,289 observations in our sample based on starting price. Each decile

EXHIBIT 5

Return by Starting Price

Distressed Debt Index Members—January 1997, 1999, 2001, 2003, 2005

Starting Price	Count	Average Return (%)*	Standard Deviation
0.001-10	27	135.63%	342.00%
10.001-20	43	42.70%	102.32%
20.001-30	92	39.52%	80.09%
30.001-40	85	25.91%	57.45%
40.001-50	160	29.94%	58.47%
50.001-60	204	20.90%	40.73%
60.001-70	227	9.41%	32.21%
70.001-80	224	4.22%	24.08%
80.001-90	177	2.46%	31.48%
90.001-100+	50	2.08%	21.65%
	1,289		

* *Mean annual return. Issues leaving the index in less than one year are time weighted for their period of inclusion.*

Note: For the five years in our observation period, the market-value-weighted annual return of the Distressed Debt Index was 5.99%. Average returns shown in this exhibit are not market-value weighted.

Sources: Merrill Lynch & Co., Bloomberg.

has a statistically robust subsample size, ranging from 27 to 227 observations. Note the roughly normal distribution of starting prices. The >50 to ≤80 price range accounts for 51% of observations. From the mode (227), the count declines monotonically in both directions[10] except for a rise from 85 (>30 to ≤40) to 92 (>20 to ≤30).

The clear message of Exhibit 5 is that for distressed bonds, the lower the starting price, the higher the average return. From the top price range (>90) downward, average return increases monotonically, with the sole exception of a dip from 29.94% at the price range of >40 to ≤50 to 25.91% at the price range of >30 to ≤40. Fitting a logarithmic curve to the data,[11] we find that starting price explains 94.16% ($R^2 = 0.9416$) of the variance in average returns of the various quality tiers of distressed bonds.

Investors should recognize that, to put it mildly, their results may vary from the average. The ratios of standard deviation to average return range from 2 to 3 times in most starting price ranges to 6 to 13 times in the three highest starting price (lowest average return) ranges. In short, there is substantial risk of picking a poor performer within a group that displays a high average return.

An additional caveat is that our average returns are not market weighted. The 135.63% average return on the lowest price range reflects the experience of 2% of the total observations and even less of the aggregate market value. For the five years in our observation period, the average annual return of the Distressed Index, weighted by the beginning market value for each year, is 5.99%.

The Impact of Starting Price on Returns

The second section of the study answers the classic question of non-distressed investors: Should I sell automatically if a bond falls to 70, or should I continue to hold it if I believe there is a good chance of recovery? Subsequent price performance argues for holding the bond, as more than two-thirds of distressed issues in the 65 to 70 price range maintain their value or rise in the succeeding 12 months. The average annual return for bonds in the 60.001 to 70 range is 9.41%, which does not compare too unfavorably with the 10.17% average return of the Non-Distressed Index (H0ND) in the five years of our observation period. The catch is a 22% default rate which is substantially higher than non-distressed investors can typically tolerate.

A key takeaway of this study for distressed investors is that in order to achieve the highest returns, they should buy the lowest priced issues. Note that we found in the first part of the study that default rates are no higher among severely distressed issuers than among mildly distressed issuers (measured by spreads). That result upholds the theory that one might just as well be hanged for a lion as for a sheep. There is little point in being risk averse once the decision has been made to invest in highly default-prone securities. Given the limits of diversification within the distressed category,[12] however, seekers of maximum returns must recognize that the trade-off will be substantial gyrations from period to period.

ENDNOTES

[1]Option-adjusted spread (OAS) is a measure of a security's extra yield over the yield of a comparable Treasury security after accounting for any options (calls, puts, or sinking funds). Moyer [2005] cited the 1,000 bps cutoff as a commonly used criterion for defining the distressed universe.

[2]At the time Hickman wrote, the majority of states in which mutual savings banks operated restricted those institutions' purchases of corporate securities to issues meeting certain financial standards. Issues that qualified under the tests constituted the states' legal lists.

[3]The Bloomberg ticker for the index.

[4]Merrill Lynch updates the membership of its indexes once a month at month-end.

[5]The Moody's speculative grade universe includes issuers that have only loans or convertible bonds outstanding. The Merrill Lynch Master II Index excludes such companies.

[6]This is the mean of all trailing twelve-month default rates reported for the 25-year period.

[7]Hamilton [2007], p. 9.

[8]The term "speculative grade" is generally assigned to ratings below Baa3 by Moody's Investors Service or below BBB- by Fitch Ratings or Standard & Poor's.

[9]On December 31, 2007, the market-weighted OAS for issues within the Merrill Lynch High Yield Master II Index priced in the 70s (≥70 to <80) was only 912 bps. For bonds priced in the 60s (≥60 to <70), however, the figure was 1,558 bps. To be sure, these relationships vary with market conditions. On September 30, 1998, close to the cyclical maximum in high-yield bond spreads, market-weighted OAS was 1,094 bps for bonds priced in the 70s and 1,590 bps for bonds priced in the 60s. The optimal price cutoff probably is most fairly determined by observing the comparable figures in May 1999. That was the month in which credit risk, as measured by Moody's global speculative-grade default rate (percentage-of-issuers basis) at 4.80%, was closest to the 25-year monthly average of 4.76% for the period from 1983 to 2007. On May 31, 1999, bonds priced in the 70s had a market-weighted OAS of 760 bps. Bonds

in the 60s had a market-weighted OAS of 914 bps. (For issues in the 50s, the figure jumped to 1,256 bps.) In round numbers, 70 appears to be a good threshold for defining the distressed universe such that under average credit conditions it will be roughly comparable to the distressed universe defined by the standard OAS cutoff of 1,000 bps.

[10]According to http://www.thefreedictionary.com, "[e]ach member of a monotone increasing sequence is greater than or equal to the preceding member; each member of a monotone decreasing sequence is less than or equal to the preceding member."

[11]The equation of the curve is $y = 0.190 \times \text{Log (Starting Price Group)} - 0.233$.

[12]Constraints on analytical resources typically impose a ceiling on the number of names that a distressed manager can hold. Intense monitoring of credit developments is required for each name in the portfolio.

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