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Report on

Defaults & Returns on High Yield Bonds: Analysis Through 1998 and Default Outlook for 1999-2001

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Introduction and Overview

Nineteen-ninety-eight was a mixed performance year for the high yield bond market in the United States, with much below average returns and spreads over default-risk-free Treasury Bonds but continued relatively low default rates and losses and another record year of new issuance. Returns and new issuance were excellent through the first seven months of the year but returns reversed and new issues dried up, temporarily, in the wake of August's Russian default and the emerging market turmoil, causing another short-term flight to quality. Returns in 1998 on high yield bonds in the U.S. were slightly above 4.0% for the entire year, about 8.5% lower than historical averages. Return spreads also were much below average (-8.7%).

The Default Rate was again relatively low, 1.60%, and losses from default 1.1%. Despite 1998's low relative return, net returns (after deducting losses from defaults) over the last two decades continue to show a compounded result of over 12% per year and spreads over U.S. Treasuries of over 2.5% per year. New issuance of high yield debt in 1998 totaled a record $140 billion, with $115 billion of the total in the first seven and a half months.

This report documents the high yield debt market's risk and return performance by presenting default and mortality statistics and providing a matrix of average returns and other performance statistics over the relevant periods of the market's evolution. Our analysis covers the period 1971-1998 for defaults and 1978-1998 for returns. In addition, we present our annual forecast of expected defaults for the next three years (1999-2001). Two other reports, published by the NYU Salomon Center,* comprehensively document the performance of defaulted public bonds and bank loans and the default rate experience on syndicated bank loans.

*These reports are available to Associates of the Salomon Center and to subscribers to the monthly defaulted debt indexes; specifically E. Altman with L. Beltran, "The Performance of Defaulted Bonds and Bank Loans: 1987-1998," (January 1999) and E. Altman and H. Suggitt, "Default Rates in the Syndicated Bank Loan Market: A Mortality Analysis," NYU Salomon Center, W.P. #S-97-39 (December 1997) -- forthcoming in the **Journal of Banking and Finance** (1999).

Default Rates

During 1998, $7.464 billion of domestic U.S. high yield straight bonds defaulted or were exchanged under distressed conditions. This amount was comprised of 53 issues from 37 defaulting companies and resulted in a default rate of 1.60%. This compares to 29 issues from 21 companies in 1997. A list of 1998 defaults appears in **Appendix A.**[1] The 1998 default rate is somewhat higher than last year's rate (1.25%), but remains considerably below the historic weighted average annual rate from 1971-1998 of 3.1% per year (2.6% arithmetic average rate) and is slightly above the median annual rate (1.55%) over the same 28-year period - (**Exhibits 1 and 2**). The face value of defaults was about $3.3 billion higher in 1998 than one year earlier (an increase of 78% but the mid-year base population of high yield bonds also increased from $335 to $466 billion (39%); hence, the modest increase in the rate of default. The default rate in 1998 continued a six-year string of rates below 2.0% and in four of the six years the rate was below 1.5%. Over the period 1992-1998, the long-term annual weighted-average default rate has declined from 4.2% to 3.1% per year.

[1] **We have not included Eurobonds and other international defaults in these calculations since the international high yield market is not large or, indeed, clear in terms of size and coverage. We do list the aggregate amount of international issue defaults in Appendix A, which were considerable (over $9 billion) in 1998. In addition, consistent with our past approach, we do not include those issues that missed interest payments in 1998 but cured their delinquencies within the typical 30-day grace period or who missed an interest payment in December and still had a grace period remaining into 1999 (see discussion at a later point).**

Default Rates and Aging Bias

The 1.60% 1998 default rate is based on a mid-year population estimate of $465.5 billion - an amount that does not include issues that had defaulted prior to 1998 but were still outstanding. This population total was swelled by a tremendous surge in new issuance in the second half of 1997 and the first half of 1998 (public and 144a issues), further adjusted for upgrades from high yield to investment grade and downgrades to high yield status and finally by calls and other redemptions. Therefore, despite considerably higher default amounts in 1998, the default rate increased only modestly from the 1997 level.

Anytime there is a relatively large increase in new issuance in the high yield market, you will observe a downward bias in the default rate due to the "aging effect" of defaults. This can be clearly seen, at a later point, when we present our mortality statistics and observe that the marginal default/mortality rates in the first three years after issuance start out quite low, increase considerably to the third year and then, for the most part, level off thereafter. This new issuance aging effect is not possible to observe in the Moody's (dynamic cohort) or S&P's (static-pool) approaches.[2]

[2] **For an in-depth discussion of the various default rate methodologies and results, see J. Caouette, E. Altman and P. Narayanan, "Managing Credit risk: The Next Great Financial Challenge," John Wiley & Sons, New York, 1998.**

Our mortality calculations take into account the aging bias which can manifest during abnormally high new issuance periods. Despite all of this, we observe that this bias, while observable, was not very substantial in 1998, now that the high yield market is as large as it is. For example, if the population base had not grown at all from the mid-year 1997 figure, the 1998 default rate would have been 2.23%.

Quarterly and Industry Defaults

Appendix B calculates default rates on a quarterly basis (since 1990). It can be observed that the quarterly rates in 1998 fluctuated considerably with the fourth quarter's rate (0.47%) the second highest. As noted in our earlier reports, quarterly rates almost never are indicative of trends except possibly back in the 1990-1991 period when default rates skyrocketed to record levels over several consecutive quarters. For example, the fourth quarter's rate would have been considerably higher had we included all issues which missed interest payments in December but still had some grace period time remaining at year-end.

Appendix C lists the defaults since 1970 by industry affiliation. The "leading" sectors in 1998 include General Manufacturing (6), Financial Services (6), Communications (6), Retailing (6) and Leisure/Entertainment (5). We do not calculate default rates by industrial sector although we have analyzed industrial sector recoveries (see Altman and Kishore, 1996). Updated data from that study is given in **Appendix D**.

Default Losses and Recovery at Default

Default losses did rise substantially in1998 versus 1997 (1.10% vs. 0.65%) but were still far below the average from 1978-1998 of 1.82% per year (2.05% weighted average annual rate). **Exhibit 3** shows the 1998 loss rate, which includes the loss of one-half of the average annual coupon. Default losses for the last 21 years are shown in **Exhibit 4**.

The average recovery rate on the issues for which we had end-of-default month prices was 35.9% - somewhat below the venerable 40-42% historical average recovery rate (**Exhibit 4 & 5**) and considerably lower than last year's figure (54.2%). This was surprising since 44 of the 53 defaulting issues were senior secured or senior unsecured and less than 10 were subordinated; seven were discounted bonds, where we use accreted values as the base. About 70% of all new issuance in the high yield market since 1991 have been senior in priority. This lower than average 1998 recovery rate is a caution to investors who cannot assume that senior bonds will always result in above average recovery rates. For example, the senior unsecured recovery rate in 1998 was 39.57% vs. an historical average of over 48%. **Exhibit 5** lists the recovery rates (prices just after default) by seniority for 1998 and for the past 21 years. Most of the seniority levels recovered lower amounts in 1998 than the historical 21 year average, with the exception of the senior secured group. The overall arithmetic average 21-year recovery rate of $40.41 is based on over 800 issues (42.5% average, weighted by the amount outstanding in each year - Exhibit 4).

In **Exhibit 6**, we list the average recovery at default stratified by original bond rating for the period 1971-1998. The weighted recoveries for investment

grade bonds definitely show higher rates than for non-investment grade debt, but the three "junk" bond classes continue to show very little differences. This is also true, after adjusting for seniority bias.

Exhibit 7 lists the original Standard & Poor's ratings of defaulting issues, as well as the one year and six-months-prior to default ratings. Of the 756 issues tabulated, 77.1% were original issue high yield bonds and 22.9% were originally rated as investment grade but eventually defaulted; 8.2% of the defaulted issues were still rated investment grade one year prior to default and 6.9% six months prior (multiple issues from a few large high grade issuers, e.g., Columbia Gas System, however, accounted for a large proportion of the 12 and six-month-prior investment grade defaults) and most of these were BBB.

Exhibit 8 shows that the time it takes for an issue to default compared to its issuance date makes virtually no difference in the recovery rate. The possible exception is the $47.63 weighted recovery in the first year, which is almost matched by the slightly over 50% in the ninth year. Most other weighted recoveries by year are in the high $30's to low $40's range.

We also observe (not shown here) that the number of years remaining in a bond issue's maturity is not at all related to its likelihood of defaulting. In other words, companies usually default due to their inability to meet interest payments and not the principal repayment at maturity. A related key factor to observe is the date when non-cash pay deferred-interest-bonds do become cash pay, e.g., after three years from issuance. Many new recent issues in certain industries, e.g., telecom, have this feature.

Interest Payment Grace Periods and Accreted Values: Impact on Default Rates and Losses

It is well known that the calculation of meaningful default rates and losses is an art more than a science and that the number of possible alternative methods is staggering when you consider all of the subtleties. Two factors that we have consistently considered over the years in the calculation of default rates are the treatment of interest payment grace periods and accreted values on discounted bond defaults. A "legal" default in public bond markets involves the missing of an interest payment when it comes due and the failure to "cure" that missed payment within a specified grace period (usually 30 days). We have always applied this rule and in 1998 there were two bond issuers ($461 million face value) that did indeed miss an interest payment but managed to cure that miss within the grace period (All Star Gas Corp. and Service Merchandise Company). In addition, during December 1998, there were $836 million in face value interest payment misses that had a grace period extending into 1999. Since the grace period did not expire by year-end, in most cases, we will only include these bonds as defaults in January 1999, assuming the payments are not cured.[3] If we had included both the cured interest payments misses and December's "misses," the default rate in 1998 would have been 1.88%.

With respect to accreted values of discounted bonds, we feel it is not appropriate to use the full face value of the issue in our default rate and default loss calculations. Only the accreted value, i.e., the value that investors could

[3] **Penn Traffic Company missed an interest payment on $200 million of bonds on December 15, triggering cross-default clauses on an additional $932 million. Since the grace period was only 15 days, we include it in 1998 results.**

theoretically have sold their bonds for at the time of default (if there were no credit problems) is appropriate. In 1998, there were seven discounted bonds that defaulted (see Appendix A), an unusually large number. The difference between the face and accreted values of these issues was $600 million. In addition, our calculation of the recovery rate (Exhibits 3, 4 and 5) is based on the price that the bonds traded at just after default as a percentage of the accreted value, not the face value. This procedure results in a higher recovery rate and a lower loss rate than would be the case if face values were used.

Mortality Rates, Losses and Simulated Return Spreads

Updated mortality rates and losses from 1971-1998 are reported in **Exhibit 9 and 10**. Our total defaulted issue population that had a rating upon issuance and a price at default now numbers 682 issues. The methodology for these calculations comes from Altman (1989) and adjusts for calls, sinking funds and other redemptions. Similar to actuarial insurance calculations, our mortality method measures default experience for major rating categories from the "birth" of the issue and is market (not issuer) weighted. It clearly adjusts for the aging bias (discussed below).

The relatively low 1998, and last six-year default rates, have reduced cumulative mortality rates slightly and losses throughout the entire spectrum of ratings and horizons. For example, the five-year cumulative rates through 1998 vs. 1994 were for BBB (1.46% vs. 2.39%), for BB (7.47% vs. 10.79%), for B (19.11% vs. 23.71%), and for CCC (36.07% vs. 45.63%). Also, all of the five- and ten-year cumulative rates were lower through 1998 versus 1997, reflecting

the continued drop in default rates in recent years. For example, the five-year single-B rate dropped to 19.11% from 21.95%.

As for the aging effect of bond defaults (mentioned earlier), we do find evidence of this for BBB and B rated bonds during the first four years after issuance and for BB and CCC rated bonds for three years, but no relationship thereafter. This can be observed by the yearly (marginal) mortality rates in Exhibit 9. The BB marginal rates are somewhat erratic, rising for the first three years and then fluctuating thereafter. Single-B marginal rates rise for the first four years, reach a steady state of about 4-6% per year for years three through seven, and then fall off thereafter.

Similar results can be found for mortality losses in Exhibit 10. These are actual losses adjusted for recoveries at default and the loss of one semi-annual interest payment. Recall that these marginal and cumulative mortality rates and losses reflect underlying cohort populations that are adjusted each year for defaults, distressed restructurings and redemptions (calls).

In addition to the mortality rates and losses for the period 1971-1998, we have also calculated those statistics for the period when the high yield bond market began its significant new issuance trend (1983). **Exhibits 11 and 12** depict the mortality statistics for the 1983-1998 timespan. Note from Exhibit 1 that in 1983 the amount outstanding increased by about 50% when new issuance that year was about $15 billion.

Comparing mortality statistics from our traditional starting point (1971) to the later starting date (1983), we can observe that, in general, cumulative

mortality rates are essentially the same for the non-investment grade ratings in the shorter, more recent, sample period (i.e., the 1983-1998 period).

Exhibit 13 lists a type of "simulated-actual" return **spread** of corporate bonds (per $100 of investment) over long-term U.S. Treasuries for up to ten years after issuance, covering the period 1971-1998. This analysis assumes the investor bought the indicated rating category and held for ten years (semi-annual holding periods). The return spread changes over time as interest rates change and returns are adjusted for reinvested cash flows, at the then prevailing rate, from coupon payments and recoveries on defaults. Prices of individual issues, however, do not change unless a default occurs. Data on defaults and losses are derived from our database, which is the same source that was used in Exhibits 9 -12.

Results through 1998 for 10-year-horizons continue to indicate that the Double-B class performs best, followed closely by Triple-B bonds. This is confirmation for the now more commonly found "crossover" investment strategy, which involves purchasing split BBB/Ba or Baa/BB bonds as well as double B's. Single-B return spreads are lower than the BB and BBB classes, but they improved from earlier results. Although BB bonds continue to perform better than B-rated issues, the differential narrowed in 1998 vs. 1994-1997 results. Note that Exhibit 13 does not include the impact of price changes caused by interest rate fluctuations or those caused by overall market perceptions. Hence, the results are "simulated" in that market risk is not factored in.

Total Returns

Exhibits 14-17 document the actual total returns and spreads on high yield bonds compared to 10-year U.S. Treasuries for the period 1978-1998 inclusive.[4] **Exhibit 14** shows each year's return and return spread as well as the promised yield to maturity and yield spread at year end. The high yield bond return **spread** over U.S. Treasuries was -8.73% in 1998, considerably below the 1978-1998 arithmetic annual average of 2.53% (2.57% compound annual average). The returns are net of defaults. Returns and spreads in 1998 were much below average primarily due to the precipitous drop and only modest recovery from the flight to quality effects of August and September.

The compound average annual return **spread** decreased to 2.57% in 1998. The 2.57% return spread can be compared to the average annual yield spread of 4.53%. The difference (just under 200 b.p. per year) is very close to our average annual default loss (2.05% per year) found in Exhibit 4.

Exhibit 14 also shows promised yields and spreads. At the end of 1998, the yield spread was 5.39%, up considerably from 1997's 3.45% and also above the historic average of 4.53%. During 1998, the yield spread increased by almost 200 basis points as yields on Treasuries dropped and high yield bond yields increased from 9.20% to 10.04%. Again, the flight to quality was the primary cause. We note that the above average 1998 12.77% return on 10-year U.S. Treasuries was due to the fairly sharp decrease in interest rates.

Exhibits 15 and 16 show matrices of high yield compound returns and spreads over ten-year U.S. Treasuries for all possibly beginning-of-year and end-

[4] **Please note that these statistics are somewhat different than found in the comparable Exhibits in prior years' reports. We are now using the returns, yields and spreads from Salomon Smith Barney**

of-year points. Note the relatively high absolute compound returns for most investment horizons, translating to double-digit absolute returns. Return spreads are for the most part positive, although not for all horizons.

Exhibit 17 shows that $1,000 invested in high yield bonds at the end of 1977 and compounded over the 21-year period, January 1978 to December 1998, would be worth $10,865; considerably more than the $6,678 if invested in 10-year U.S. Treasuries.

Outlook for the Supply and Demand of Distressed Securities

We have observed that there has been a considerable reduction in the size of the public and private distressed debt market in the past few years, which is certainly clear in the diminished size of our defaulted debt indexes.[5] The supply of new defaults clearly did not keep pace with those firms that emerged in one form or another from distressed restructuring. Also, the relatively low default rate in recent years (Exhibit 1) did not add sizeable amounts to our Indexes and to the population of defaulted securities.

As for the future, we expect the market for distressed and defaulted securities to increase considerably. The huge new issue supply of non-investment grade debt in the last seven years of over $460 billion should result in an increase of default amounts in the coming years. While we do not expect the near-term default rates and numbers to approach the record years of 1990 and 1991, or perhaps even to reach the weighted average levels of 1971-1998 (3.1% per year), the net supply of distressed and defaulted issues will almost certainly

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Inc's high yield Composite Index comprising about 1400 bonds (December 1998).

increase. This is partially a function of the considerable number of defaults that have already emerged, leaving a relatively small number of existing issues, compared to our expected larger number of new defaults.

A critical question for high yield bond and distressed security investors is the likely supply of new defaulted and distressed paper. We do not use a formal econometric model for predicting near term default rates. We feel, however, that a reasonable method would be to extrapolate default totals based on the amount of new issuance in the recent past and the relationship between new issuance, segregated by original bond credit ratings, and expected defaults of these new issues. A method for doing just this is the mortality rate approach, first developed in the late 1980's (Altman 1989) and updated each year. As discussed earlier, mortality rates, based on new issuance from 1971-1997 and defaults through 1998, are given in **Exhibit 9**. Based on this method, we estimated $9.7 billion of defaults in 1998 -- about $2 billion higher than actual defaults.

Based on actual new issuance by bond rating from 1989-1998 and expected new issuance in 1999 and 2000,[6] as well as the *marginal* mortality rate results in Exhibit 9, we estimate the new *publicly traded* bond default totals will increase substantially and have a face value of approximately $46 billion over the next three years (**Exhibit 18**). Due to the high proportion of senior bonds issued in the high yield debt market since 1992 - about 70 percent of the total new

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[5] See the NYU Salomon Center Annual Report, "The Investment Performance of Defaulted Bonds and Bank Loans: 1987-1998" by E. Altman with L. Beltran (1999).

[6] We have projected new issuance by bond rating for 1999 and 2000 by using arithmetic averages for the previous five-year period 1994-1998.

issuance - the expected average price at default is expected to be close to 50% of par value (compared to the venerable 40% for all defaults). This implied a market value estimate of about $23 billion of new public defaults over the period 1999-2001 (**Exhibit 19**).

From Exhibit 18, we observe that 1999 expected defaults are $11.3 billion, about 50% above the amount from 1998. Assuming a modest increase in the population of high yield bonds to $500 billion by mid-1999, the resulting default rate is 2.26% -- still below historic averages.

According to our methodology, these public defaults will be accompanied by a new *private* defaulted debt face value total of about $111 billion. This is based on a 2.4 to 1.0 ratio of private to public debt of defaulting companies (Altman and Beltran 1999). The resulting expected total of public and private defaulted debt at face value for the next three years is therefore approximately $157 billion; $101 billion market value. Incidentally, although these numbers look quite large, the implied default rate in these estimates for the U.S. high yield debt market is in the range of 2.3% (1999) to 3.0% by the year 2001. These rates are below or equal to the historical annual weighted average and assumes that the population of high yield bonds rises to $600 billion by the year 2001.

Summary and Outlook

In conclusion, 1998 was a below average year for high yield debt in terms of absolute and relative returns. On the positive side, default rates were again below 2.0% and new issues again set a record. Investor concern with high yield

bonds was reflected in a relatively high promised yield spread at the end of 1998, but this spread was considerably lower than it was a few months earlier.

As noted above, our forecasts are based on extrapolation of historical default rates by bond rating and the past ten years and expected next two years of new issuance. The forecasted defaults are demonstrably greater than recent experience and may be viewed as unnecessarily pessimistic, given these recent low defaults. On the other hand, recent new issuance data casts a very different light on the forecast. Low grade new issuance, e.g., B- or below rated issues, swelled in 1998 to the highest proportion of total high yield new issuance since the late 1980's, and the CCC-rated category alone contributed almost $10 billion of new issues in 1998 (not to mention significant net downgrades to CCC in recent years). Combined with the non-rated, new issue segment of about $15 billion in 1998, these two categories are likely to contribute large numbers of defaults, especially if the economy and the stock market sag.

We have been estimating higher default rates for the last two years but our estimates have been below actual results. We again expect higher default amounts in 1999-2001, and probably higher default rates as well. These rates will, however, more than likely remain below or eventually rise to the historic 3.0% per year average.

EXHIBIT 1

HISTORICAL DEFAULT RATES - STRAIGHT BONDS ONLY
EXCLUDING DEFAULTED ISSUES FROM PAR VALUE OUTSTANDING
1971 - 1998 ($ MILLIONS)

YEAR	PAR VALUE OUTSTANDING (a)	PAR VALUE DEFAULTS	DEFAULT RATES	
1998	$465.500	$7.464	1,603%	
1997	$335.400	$4.200	1,252%	
1996	$271.000	$3.336	1,231%	
1995	$240.000	$4.551	1,896%	
1994	$235.000	$3.418	1,454%	
1993	$206.907	$2.287	1,105%	
1992	$163.000	$5.545	3,402%	
1991	$183.600	$18.862	10,273%	
1990	$181.000	$18.354	10,140%	
1989	$189.258	$8.110	4,285%	
1988	$148.187	$3.944	2,662%	
1987	$129.557	$7.486	5,778%	
1986	$90.243	$3.156	3,497%	
1985	$58.088	$992	1,708%	
1984	$40.939	$344	0,840%	
1983	$27.492	$301	1,095%	
1982	$18.109	$577	3,186%	
1981	$17.115	$27	0,158%	
1980	$14.935	$224	1,500%	
1979	$10.356	$20	0,193%	
1978	$8.946	$119	1,330%	
1977	$8.157	$381	4,671%	
1976	$7.735	$30	0,388%	
1975	$7.471	$204	2,731%	
1974	$10.894	$123	1,129%	
1973	$7.824	$49	0,626%	
1972	$6.928	$193	2,786%	
1971	$6.602	$82	1,242%	Standard Deviation
ARITHMETIC AVERAGE DEFAULT RATE		1971 TO 1998	2,577%	2,515%
		1978 TO 1998	2,790%	2,753%
		1985 TO 1998	3,592%	2,999%
WEIGHTED AVERAGE DEFAULT RATE (b)		1971 TO 1998	3,054%	3,308%
		1978 TO 1998	3,075%	2,890%
		1985 TO 1998	3,166%	2,921%
MEDIAN ANNUAL DEFAULT RATE		1971 TO 1998	1,552%	

Notes

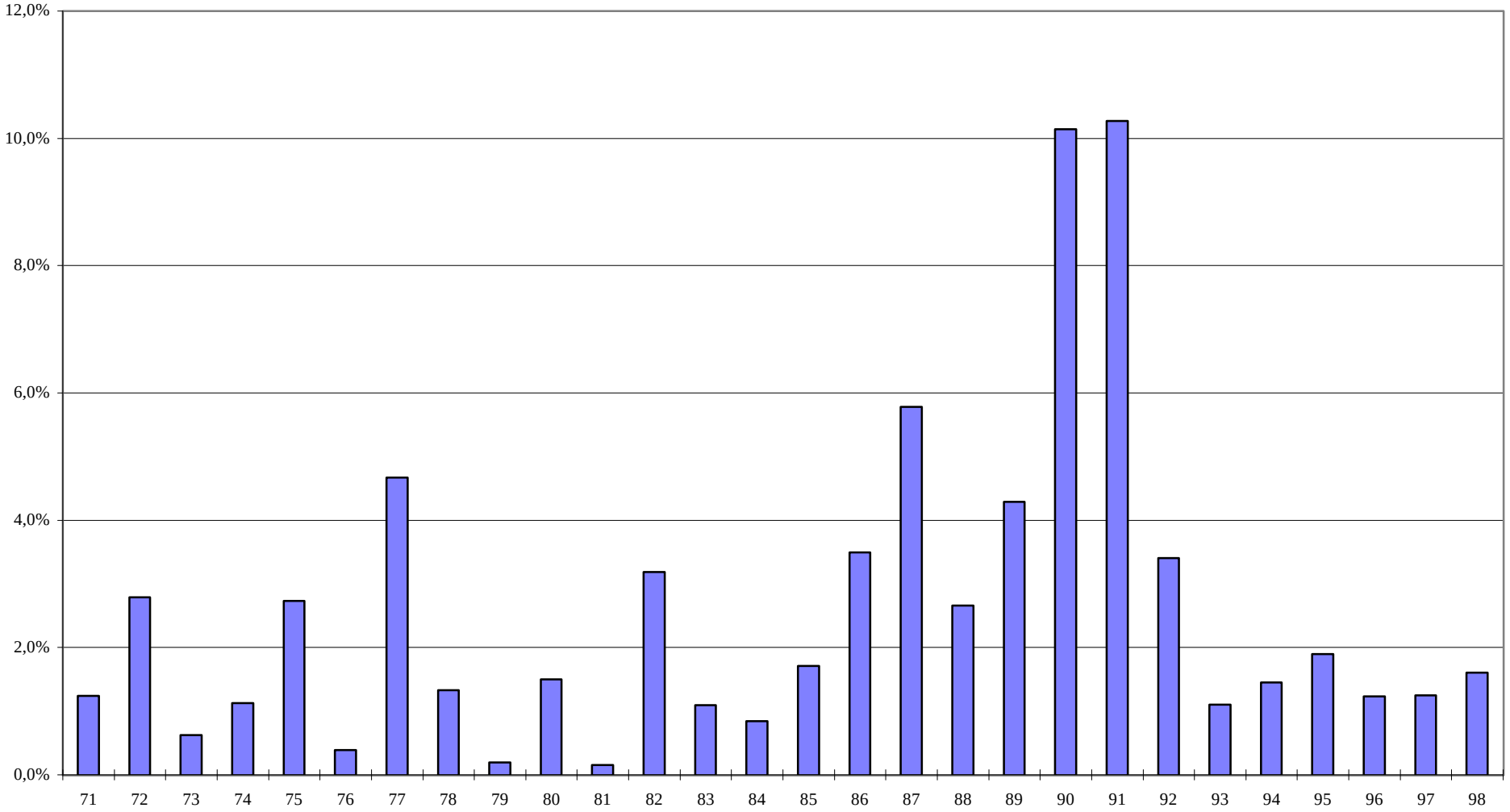
(a) As of mid-year.

(b) Weighted by par value of amount outstanding for each year.

Source: Authors' Compilation and various dealer estimates

EXHIBIT 2

EXHIBIT 2
HISTORICAL DEFAULT RATES (1971 - 1998)



Source: Exhibit 1

EXHIBIT 3
1998 DEFAULT LOSS RATE

BACKGROUND DATA	
AVERAGE DEFAULT RATE 1998	1,603%
AVERAGE PRICE AT DEFAULT (a)	35,863%
AVERAGE LOSS OF PRINCIPAL	64,137%
AVERAGE COUPON PAYMENT	9,460%
DEFAULT LOSS COMPUTATION	
DEFAULT RATE	1,603%
X LOSS OF PRINCIPAL	64,137%
DEFAULT LOSS OF PRINCIPAL	1,028%
DEFAULT RATE	1,603%
X LOSS OF 1/2 COUPON	4,730%
DEFAULT LOSS OF COUPON	0,076%
DEFAULT LOSS OF PRINCIPAL AND COUPON	**1,104%**

(a) If default date price is not available, end-of-month price is used.

Source: Authors' Compilations and various dealer quotes.

EXHIBIT 4
DEFAULT RATES AND LOSSES (a)
(1978 - 1998)

YEAR	PAR VALUE OUTSTANDING (a) ($ MMs)	PAR VALUE OF DEFAULT ($ MMs)	DEFAULT RATE (%)	WEIGHTED PRICE AFTER DEFAULT	WEIGHTED COUPON (%)	DEFAULT LOSS (%)
1998	$465.500	$7.464	1,60%	$35,9	9,46%	1,10%
1997	$335.400	$4.200	1,25%	$54,2	11,87%	0,65%
1996	$271.000	$3.336	1,23%	$51,9	8,92%	1,10%
1995	$240.000	$4.551	1,90%	$40,6	11,83%	1,24%
1994	$235.000	$3.418	1,45%	$39,4	10,25%	0,96%
1993	$206.907	$2.287	1,11%	$56,6	12,98%	0,56%
1992	$163.000	$5.545	3,40%	$50,1	12,32%	1,91%
1991	$183.600	$18.862	10,27%	$36,0	11,59%	7,16%
1990	$181.000	$18.354	10,14%	$23,4	12,94%	8,42%
1989	$189.258	$8.110	4,29%	$38,3	13,40%	2,93%
1988	$148.187	$3.944	2,66%	$43,6	11,91%	1,66%
1987	$129.557	$7.486	5,78%	$75,9	12,07%	1,74%
1986	$90.243	$3.156	3,50%	$34,5	10,61%	2,48%
1985	$58.088	$992	1,71%	$45,9	13,69%	1,04%
1984	$40.939	$344	0,84%	$48,6	12,23%	0,48%
1983	$27.492	$301	1,09%	$55,7	10,11%	0,54%
1982	$18.109	$577	3,19%	$38,6	9,61%	2,11%
1981	$17.115	$27	0,16%	$12,	15,75%	0,15%
1980	$14.935	$224	1,50%	$21,1	8,43%	1,25%
1979	$10.356	$20	0,19%	$31,	10,63%	0,14%
1978	$8.946	$119	1,33%	$60,	8,38%	0,59%
ARITHMETIC AVERAGE 1978-1998:			2,79%	$42,5	11,38%	1,82%
WEIGHTED AVERAGE 1978-1998:			3,07%			2,05%

Notes

(a) Excludes defaulted issues.

Source: Exhibits 1 and 3

Exhibit 5

WEIGHTED AVERAGE RECOVERY RATES ON DEFAULTED DEBT BY SENIORITY PER $100 FACE AMOUNT

(1978 - 1998)

Default Year	Senior Secured		Senior Unsecured		Senior Subordinated		Subordinated		Discount and Zero Coupon		All Seniorities	
	No.	$	No.	$	No.	$	No.	$	No.	$	No.	$
1998	6	$70,38	21	$39,57	6	$17,54	0	0	1	$17,00	34	37,27
1997	4	$74,90	12	$70,94	6	$31,89	1	$60,00	2	$19,00	25	$53,89
1996	4	$59,08	4	$50,11	9	$48,99	4	$44,23	3	$11,99	24	$51,91
1995	5	$44,64	9	$50,50	17	$39,01	1	$20,00	1	$17,50	33	$41,77
1994	5	$48,66	8	$51,14	5	$19,81	3	$37,04	1	$5,00	22	$39,44
1993	2	$55,75	7	$33,38	10	$51,50	9	$28,38	4	$31,75	32	$38,83
1992	15	$59,85	8	$35,61	17	$58,20	22	$49,13	5	$19,82	67	$50,03
1991	4	$44,12	69	$55,84	37	$31,91	38	$24,30	9	$27,89	157	$40,67
1990	12	$32,18	31	$29,02	38	$25,01	24	$18,83	11	$15,63	116	$24,66
1989	9	$82,69	16	$53,70	21	$19,60	30	$23,95			76	$35,97
1988	13	$67,96	19	$41,99	10	$30,70	20	$35,27			62	$43,45
1987	4	$90,68	17	$72,02	6	$56,24	4	$35,25			31	$66,63
1986	8	$48,32	11	$37,72	7	$35,20	30	$33,39			56	$36,60
1985	2	$74,25	3	$34,81	7	$36,18	15	$41,45			27	$41,78
1984	4	$53,42	1	$50,50	2	$65,88	7	$44,68			14	$50,62
1983	1	$71,00	3	$67,72			4	$41,79			8	$55,17
1982			16	$39,31			4	$32,91			20	$38,03
1981	1	$72,00									1	$72,00
1980			2	$26,71			2	$16,63			4	$21,67
1979							1	$31,00			1	$31,00
1978			1	$60,00							1	$60,00
Total/Average	99	$59,38	258	$48,12	198	$34,46	219	$31,71	37	$20,61	811	$40,41
Median		$59,85		$50,11		$35,20		33,39		$17,50		41,7688
Std.Dev.		$23,18		$26,16		$24,75		$22,53		$17,46		$25,77

Source: Authors' Compilation from Various Dealer Quotes

Exhibit 6

AVERAGE PRICE AFTER DEFAULT BY ORIGINAL BOND RATING
(1971 - 1998)

Rating	No. of Observations	Average Price	Weighted Average Price	Median Price	Std. Dev.	Minimum Price	Maximum Price
AAA	7	$68,34	$76,99	$71,88	$20,82	$32,00	$97,00
AA	20	$59,59	$76,52	$54,25	$24,59	$17,80	$99,88
A	56	$60,63	$47,59	$61,32	$25,53	$10,50	$100,00
BBB	84	$49,05	$49,59	$50,00	$23,40	$2,00	$103,00
BB	79	$39,25	$39,20	$34,50	$22,08	$1,00	$98,75
B	416	$37,84	$36,72	$34,38	$24,46	$0,50	$112,00
CCC	121	$38,23	$35,22	$30,00	$27,67	$1,00	$103,25
Total	783	$41,70	$40,16	$37,00	$25,73	$0,50	$112,00

Source: Authors' Compilation

EXHIBIT 7

RATING DISTRIBUTION OF DEFAULTED ISSUES (a)
AT VARIOUS POINTS PRIOR TO DEFAULT
(1971-1998)

	ORIGINAL RATING		RATING ONE YEAR PRIOR TO DEFAULT		RATING SIX MONTHS PRIOR TO DEFAULT	
	Number	Percentage	Number	Percentage	Number	Percentage
AAA	5	0,7%	0	0,0%	0	0,0%
AA	25	3,3%	0	0,0%	0	0,0%
A	66	8,7%	5	0,8%	2	0,3%
BBB	77	10,2%	48	7,4%	45	6,6%
Total Investment Grade	173	22,9%	53	8,2%	47	6,9%
BB	90	11,9%	80	12,3%	62	9,1%
B	385	50,9%	325	50,1%	287	42,0%
CCC	104	13,8%	174	26,8%	240	35,1%
CC	4	0,5%	12	1,8%	41	6,0%
C	0	0,0%	5	0,8%	6	0,9%
Total Noninvestment Grade	583	77,1%	596	91,8%	636	93,1%
TOTAL	756	100%	649	100%	683	100%

(a) Based on Standard & Poor's Bond Ratings

Source: Authors' Compilation

Exhibit 8

WEIGHTED AVERAGE PRICE AT DEFAULT BY NUMBERED YEARS AFTER ISSUANCE (1971 - 1998)

Years To Default	No. of Observations	Average Price	Weighted Avg. Price	Median Price	Standard Deviation
1	34	$44,53	$47,63	$34,50	$26,26
2	105	$38,90	$36,75	$36,50	$22,58
3	130	$39,41	$36,62	$35,00	$25,83
4	121	$42,52	$42,27	$39,00	$25,00
5	103	$42,03	$41,03	$37,00	$26,78
6	82	$39,25	$39,25	$35,00	$25,71
7	41	$37,60	$44,71	$35,75	$25,87
8	33	$36,75	$34,51	$27,00	$27,35
9	19	$41,99	$50,22	$33,00	$27,34
10	25	$38,52	$42,69	$32,00	$23,47
All	693	$40,18	$39,76	$36,00	$25,31

Source: Authors' Compilation

Exhibit 9

MORTALITY RATES BY ORIGINAL RATING - ALL RATED CORPORATE BONDS*

(1971 - 1998)

Years after issuance

		1	2	3	4	5	6	7	8	9	10
AAA	Yearly	0,00%	0,00%	0,00%	0,00%	0,05%	0,00%	0,00%	0,00%	0,00%	0,00%
	Cumulative	0,00%	0,00%	0,00%	0,00%	0,05%	0,05%	0,05%	0,05%	0,05%	0,05%
AA	Yearly	0,00%	0,00%	0,36%	0,22%	0,00%	0,00%	0,00%	0,00%	0,03%	0,03%
	Cumulative	0,00%	0,00%	0,36%	0,58%	0,58%	0,58%	0,58%	0,58%	0,62%	0,65%
A	Yearly	0,00%	0,00%	0,03%	0,10%	0,05%	0,10%	0,04%	0,12%	0,08%	0,00%
	Cumulative	0,00%	0,00%	0,03%	0,13%	0,18%	0,28%	0,32%	0,44%	0,53%	0,53%
BBB	Yearly	0,02%	0,29%	0,27%	0,61%	0,28%	0,42%	0,16%	0,07%	0,07%	0,29%
	Cumulative	0,02%	0,31%	0,58%	1,19%	1,46%	1,88%	2,03%	2,10%	2,17%	2,45%
BB	Yearly	0,36%	0,73%	2,65%	1,65%	2,29%	1,14%	2,11%	0,25%	1,52%	3,38%
	Cumulative	0,36%	1,09%	3,71%	5,30%	7,47%	8,52%	10,46%	10,68%	12,04%	15,02%
B	Yearly	1,14%	3,00%	5,71%	6,24%	4,59%	3,36%	2,93%	1,88%	1,54%	1,04%
	Cumulative	1,14%	4,10%	9,57%	15,22%	19,11%	21,83%	24,12%	25,55%	26,70%	27,45%
CCC	Yearly	2,03%	13,60%	15,16%	8,27%	2,96%	9,59%	4,02%	3,36%	0,00%	3,71%
	Cumulative	2,03%	15,36%	28,19%	34,13%	36,07%	42,21%	44,53%	46,39%	46,39%	48,38%

*** Rated by S & P at Issuance**
Based on 681 issues
Source: Standard & Poor's (New York) and Authors' Compilation

Exhibit 10

MORTALITY LOSSES BY ORIGINAL RATING - ALL RATED CORPORATE BONDS*

(1971 - 1998)

Years after issuance

		1	2	3	4	5	6	7	8	9	10
AAA	Yearly	0,00%	0,00%	0,00%	0,00%	0,01%	0,00%	0,00%	0,00%	0,00%	0,00%
	Cumulative	0,00%	0,00%	0,00%	0,00%	0,01%	0,01%	0,01%	0,01%	0,01%	0,01%
AA	Yearly	0,00%	0,00%	0,07%	0,08%	0,00%	0,00%	0,00%	0,00%	0,02%	0,02%
	Cumulative	0,00%	0,00%	0,07%	0,15%	0,15%	0,15%	0,15%	0,15%	0,17%	0,19%
A	Yearly	0,00%	0,00%	0,02%	0,06%	0,04%	0,07%	0,02%	0,07%	0,05%	0,00%
	Cumulative	0,00%	0,00%	0,02%	0,08%	0,12%	0,19%	0,21%	0,28%	0,32%	0,32%
BBB	Yearly	0,02%	0,17%	0,15%	0,32%	0,10%	0,26%	0,14%	0,05%	0,04%	0,20%
	Cumulative	0,02%	0,19%	0,33%	0,66%	0,76%	1,01%	1,15%	1,19%	1,24%	1,44%
BB	Yearly	0,25%	0,46%	1,99%	1,26%	1,19%	0,92%	1,12%	0,15%	0,85%	1,75%
	Cumulative	0,25%	0,70%	2,68%	3,91%	5,05%	5,92%	6,98%	7,12%	7,90%	9,52%
B	Yearly	0,67%	1,99%	4,45%	4,23%	3,36%	2,12%	1,80%	1,39%	0,82%	0,67%
	Cumulative	0,67%	2,65%	6,97%	10,91%	13,90%	15,72%	17,24%	18,39%	19,05%	19,60%
CCC	Yearly	1,02%	11,09%	10,66%	4,98%	1,85%	6,60%	3,60%	2,67%	0,00%	3,09%
	Cumulative	1,02%	12,00%	21,39%	25,30%	26,68%	31,52%	33,98%	35,75%	35,75%	37,73%

*** Rated by S & P at Issuance**
Based on 681 issues
Source: Standard & Poor's (New York) and Authors' Compilation

Exhibit 11

MORTALITY RATES BY ORIGINAL RATING - ALL RATED CORPORATE BONDS*

(1983 - 1998)

Years after issuance

		1	2	3	4	5	6	7	8	9	10
AAA	Yearly	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
	Cumulative	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
AA	Yearly	0,00%	0,00%	0,44%	0,25%	0,00%	0,00%	0,01%	0,00%	0,00%	0,00%
	Cumulative	0,00%	0,00%	0,44%	0,69%	0,69%	0,69%	0,70%	0,70%	0,70%	0,70%
A	Yearly	0,00%	0,00%	0,03%	0,11%	0,06%	0,02%	0,02%	0,05%	0,05%	0,00%
	Cumulative	0,00%	0,00%	0,03%	0,15%	0,21%	0,23%	0,25%	0,30%	0,36%	0,36%
BBB	Yearly	0,02%	0,29%	0,26%	0,68%	0,24%	0,41%	0,09%	0,05%	0,00%	0,00%
	Cumulative	0,02%	0,31%	0,58%	1,25%	1,49%	1,89%	1,99%	2,04%	2,04%	2,04%
BB	Yearly	0,38%	0,75%	2,69%	1,54%	2,42%	1,01%	2,19%	0,30%	1,83%	0,96%
	Cumulative	0,38%	1,13%	3,78%	5,26%	7,56%	8,49%	10,50%	10,77%	12,40%	13,24%
B	Yearly	1,16%	3,03%	5,85%	6,14%	4,62%	2,99%	2,80%	1,18%	0,72%	0,59%
	Cumulative	1,16%	4,15%	9,75%	15,30%	19,21%	21,62%	23,82%	24,72%	25,26%	25,70%
CCC	Yearly	2,06%	13,82%	15,30%	8,42%	3,04%	9,75%	3,84%	2,86%	0,00%	0,00%
	Cumulative	2,06%	15,60%	28,51%	34,53%	36,52%	42,71%	44,91%	46,48%	46,48%	46,48%

*** Rated by S & P at Issuance**
Based on 573 issues
Source: Standard & Poor's (New York) and Authors' Compilation

Exhibit 12

MORTALITY LOSSES BY ORIGINAL RATING - ALL RATED CORPORATE BONDS*

(1983 - 1998)

Years after issuance

		1	2	3	4	5	6	7	8	9	10
AAA	Yearly	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
	Cumulative	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
AA	Yearly	0,00%	0,00%	0,09%	0,09%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
	Cumulative	0,00%	0,00%	0,09%	0,17%	0,17%	0,17%	0,18%	0,18%	0,18%	0,18%
A	Yearly	0,00%	0,00%	0,02%	0,07%	0,04%	0,01%	0,00%	0,02%	0,04%	0,00%
	Cumulative	0,00%	0,00%	0,02%	0,09%	0,14%	0,15%	0,15%	0,17%	0,21%	0,21%
BBB	Yearly	0,02%	0,17%	0,14%	0,36%	0,07%	0,24%	0,09%	0,04%	0,00%	0,00%
	Cumulative	0,02%	0,19%	0,33%	0,68%	0,76%	0,99%	1,09%	1,13%	1,13%	1,13%
BB	Yearly	0,25%	0,48%	2,01%	1,23%	1,26%	0,84%	1,09%	0,18%	1,02%	0,79%
	Cumulative	0,25%	0,73%	2,72%	3,92%	5,13%	5,93%	6,95%	7,12%	8,07%	8,79%
B	Yearly	0,67%	2,02%	4,56%	4,14%	3,39%	1,91%	1,69%	0,96%	0,28%	0,34%
	Cumulative	0,67%	2,68%	7,11%	10,96%	13,98%	15,62%	17,05%	17,85%	18,07%	18,36%
CCC	Yearly	1,04%	11,27%	10,76%	5,07%	1,88%	6,70%	3,44%	2,72%	0,00%	0,00%
	Cumulative	1,04%	12,19%	21,64%	25,61%	27,01%	31,90%	34,24%	36,03%	36,03%	36,03%

*** Rated by S & P at Issuance**
Based on 573 issues
Source: Standard & Poor's (New York) and Authors' Compilation

Exhibit 13

RETURN SPREAD OF CORPORATE BONDS OVER ISK FREE GOVERNMENTS FOR THE PERIOD 1971-1998*

Years After Issuance	Bond Rating At Issuance						
	AAA	AA	A	BBB	BB	B	CCC
0,5	$0,22	$0,36	$0,51	$0,12	$0,13	$1,45	($3,19)
1,0	$0,46	$0,05	$0,02	$0,03	$1,61	$4,12	($6,52)
1,5	$0,71	$1,05	$1,66	$2,13	$1,86	$5,00	($10,01)
2,0	$0,99	$1,45	$2,25	$2,87	$1,14	$5,73	($10,20)
2,5	$1,30	$1,87	$2,94	$3,69	$0,35	$6,51	($10,40)
3,0	$1,62	$2,41	$3,68	$4,76	$3,56	$7,62	($7,80)
3,5	$1,98	$2,99	$4,57	$5,93	$4,36	$8,80	($4,81)
4,0	$2,36	$3,62	$5,39	$7,07	$5,67	$9,19	($4,39)
4,5	$2,78	$4,31	$6,29	$8,30	$7,15	($4,69)	($3,78)
5,0	$3,24	$5,05	$7,33	$9,75	$8,34	($3,79)	$0,70
5,5	$3,73	$5,86	$8,53	$11,32	$9,62	($2,83)	$5,64
6,0	$4,27	$6,74	$9,71	$13,14	$12,23	($1,14)	$8,64
6,5	$4,84	$7,69	$11,07	$15,11	$15,07	$0,68	
7,0	$5,46	$8,70	$12,47	$17,26	$17,21	$3,51	
7,5	$6,13	$9,79	$14,09	$19,60	$19,53	$6,61	
8,0	$6,86	$10,96	$15,80	$21,72	$21,00	$9,44	
8,5	$7,64	$12,23	$17,72	$24,01	$22,56	$12,53	
9,0	$8,48	$13,63	$19,72	$27,04	$26,78	$17,54	
9,5	$9,41	$15,19	$22,19	$30,40	$31,50	$23,15	
10,0	$10,40	$16,87	$24,59	$34,03	$36,66	$29,35	

**Net Investment each period adjusted for cumulative mortality rates, calls and sinking fund redemptions. Assume sale of defaulted debt at the average price at the end of the month after default, minus loss of one semi-annual coupon payment. Assume reinvestment of all cash flows at the actual average annual YTM for the appropriate bond rating class; long-term average annual YTM used for Government bonds. Returns are expressed in dollars per $100 of investment.*

Source: Authors' Compilations, Standard & Poor's and Exhibits 8 and 9

Exhibit 14

ANNUAL RETURNS, YIELDS AND SPREADS ON TEN-YEAR TREASURY (TREAS) AND HIGH YIELD (HY) BONDS* (1978 - 1998)

	RETURN(%)			PROMISED YIELD(%)		
YEAR	HY	TREAS	SPREAD	HY	TREAS	SPREAD
1998	4,04	12,77	-8,73	10,04	4,65	5,39
1997	14,27	11,16	3,11	9,20	5,75	3,45
1996	11,24	0,04	11,20	9,58	6,42	3,16
1995	22,40	23,58	-1,18	9,76	5,58	4,18
1994	-2,55	-8,29	5,74	11,50	7,83	3,67
1993	18,33	12,08	6,25	9,08	5,80	3,28
1992	18,29	6,50	11,79	10,44	6,69	3,75
1991	43,23	17,18	26,05	12,56	6,70	5,86
1990	-8,46	6,88	-15,34	18,57	8,07	10,50
1989	1,98	16,72	-14,74	15,17	7,93	7,24
1988	15,25	6,34	8,91	13,70	9,15	4,55
1987	4,57	-2,67	7,24	13,89	8,83	5,06
1986	16,50	24,08	-7,58	12,67	7,21	5,46
1985	26,08	31,54	-5,46	13,50	8,99	4,51
1984	8,50	14,82	-6,32	14,97	11,87	3,10
1983	21,80	2,23	19,57	15,74	10,70	5,04
1982	32,45	42,08	-9,63	17,84	13,86	3,98
1981	7,56	0,48	7,08	15,97	12,08	3,89
1980	-1,00	-2,96	1,96	13,46	10,23	3,23
1979	3,69	-0,86	4,55	12,07	9,13	2,94
1978	7,57	-1,11	8,68	10,92	8,11	2,81
ARITHMETIC ANNUAL AVERAGE:						
1978-1998	12,65	10,12	2,53	12,89	8,36	4,53
COMPOUND ANNUAL AVERAGE:						
1978-1998	12,03	9,46	2,57			

* End of year yields.

Source: Salomon Smith Barney Inc.'s High Yield Composite Index.

EXHIBIT 15

COMPOUND AVERAGE ANNUAL RETURNS OF HIGH YIELD BONDS (%)
1978-1998

BASE PERIOD (JAN 1)	TERMINAL PERIOD (DECEMBER 31)																				
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
1978	7,57	5,61	3,36	4,39	9,48	11,45	11,02	12,80	13,21	12,31	12,58	11,65	9,96	12,05	12,46	12,82	11,85	12,41	12,35	12,45	12,03
1979		3,69	1,32	3,36	9,97	12,24	11,61	13,57	13,93	12,85	13,09	12,03	10,16	12,41	12,82	13,18	12,12	12,70	12,62	12,71	12,26
1980			-1,00	3,19	12,14	14,48	13,26	15,30	15,47	14,05	14,18	12,90	10,77	13,17	13,55	13,89	12,71	13,29	13,17	13,23	12,73
1981				7,56	19,36	20,17	17,14	18,87	18,47	16,38	16,24	14,56	12,02	14,55	14,86	15,12	13,76	14,32	14,12	14,13	13,54
1982					32,45	27,01	20,52	21,88	20,79	17,92	17,53	15,47	12,53	15,27	15,54	15,77	14,25	14,81	14,57	14,55	13,91
1983						21,80	14,96	18,55	18,04	15,21	15,22	13,23	10,26	13,51	13,98	14,37	12,85	13,56	13,39	13,45	12,84
1984							8,50	16,96	16,81	13,62	13,94	11,86	8,70	12,51	13,14	13,65	12,07	12,90	12,77	12,88	12,26
1985								26,08	21,20	15,38	15,35	12,54	8,73	13,10	13,73	14,24	12,43	13,31	13,13	13,22	12,54
1986									16,50	10,37	11,98	9,39	5,56	11,07	12,07	12,84	11,01	12,10	12,02	12,21	11,56
1987										4,57	9,78	7,12	2,99	10,01	11,35	12,32	10,35	11,62	11,59	11,83	11,16
1988											15,25	8,41	2,47	11,42	12,76	13,67	11,20	12,54	12,39	12,58	11,78
1989												1,98	-3,38	10,17	12,14	13,35	10,53	12,16	12,04	12,29	11,43
1990													-8,46	14,50	15,75	16,39	12,33	13,95	13,56	13,65	12,54
1991														43,23	30,16	26,09	18,23	19,05	17,71	17,21	15,48
1992															18,29	18,31	10,90	13,67	13,18	13,36	11,98
1993																18,33	7,38	12,17	11,94	12,40	10,96
1994																	-2,55	9,21	9,89	10,97	9,54
1995																		22,40	16,69	15,88	12,80
1996																			11,24	12,74	9,77
1997																				14,27	9,04
1998																					4,04

Source: Salomon Smith Barney Composite Index; Edward I. Altman, New York University Salomon Center

XHIBIT 16

RETURN SPREADS BETWEEN
T GOVERNMENT BONDS (%)
1978-1998

BASE PERIOD (JAN 1)	TERMINAL PERIOD (DECEMBER 31)																				
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
1978	8,68	6,60	5,01	5,51	3,17	5,82	4,13	3,10	1,99	2,57	3,15	1,64	0,19	1,77	2,43	2,66	2,88	2,68	3,15	3,14	2,57
1979		4,55	3,23	4,48	1,71	5,22	3,32	2,23	1,08	1,84	2,55	0,94	-0,57	1,20	1,95	2,23	2,49	2,29	2,81	2,83	2,24
1980			1,96	4,45	0,67	5,39	3,05	1,79	0,51	1,46	2,30	0,54	-1,08	0,88	1,73	2,04	2,34	2,14	2,70	2,72	2,10
1981				7,08	-0,13	6,74	3,36	1,75	0,22	1,37	2,35	0,36	-1,43	0,77	1,70	2,05	2,37	2,15	2,75	2,77	2,42
1982					-9,63	6,49	1,93	0,18	-1,39	0,29	1,59	-0,58	-2,46	0,07	1,16	1,58	1,97	1,76	2,44	2,48	1,79
1983						19,57	6,62	2,97	0,39	1,94	3,13	0,49	-1,73	0,96	2,05	2,42	2,75	2,48	3,14	3,13	2,37
1984							-6,32	-5,94	-6,48	-2,59	-0,22	-2,73	-4,75	-1,40	0,08	0,68	1,23	1,04	1,87	1,96	1,23
1985								-5,46	-6,56	-1,30	1,34	-2,00	-4,50	-0,69	0,89	1,47	1,98	1,72	2,56	2,60	1,76
1986									-7,58	0,48	3,28	-1,26	-4,32	0,00	1,67	2,23	2,68	2,33	3,18	3,17	2,24
1987										7,24	8,05	0,61	-3,61	1,38	3,08	3,51	3,84	3,34	4,16	4,06	2,98
1988											8,91	-2,99	-7,41	-0,24	2,15	2,82	3,31	2,80	3,78	3,71	2,56
1989												-14,74	-15,07	-3,32	0,44	1,58	2,38	1,93	3,14	3,14	1,93
1990													-15,34	2,59	5,68	5,82	5,82	4,76	5,73	5,41	3,80
1991														26,05	18,45	14,26	11,80	9,40	9,72	8,78	6,51
1992															11,79	9,06	7,84	5,83	6,94	6,32	4,14
1993																6,25	6,00	3,87	5,76	5,25	2,89
1994																	5,74	2,76	5,61	5,01	2,26
1995																		-1,18	5,50	4,69	1,22
1996																			11,20	7,29	1,93
1997																				3,11	-2,93
1998																					-8,73

Source: Salomon Smith Barney Composite Index; Edward I. Altman, New York University Salomon Center

APPENDIX A

1998 DEFAULTED CORPORATE STRAIGHT DEBT (a)

Company	Bond Issue	Coupon (%)	Maturity Date	Outstanding Amount ($ MM)	Default Date
Greate Bay Hotel and Casino	1st Mortgage Notes	10,875	15/01/04	182,5	05/01/98
PRT Funding Corp. (Pratt)	Senior Notes	11,625	15/04/04	85,0	05/01/98
Home Holdings, Inc.	Senior Notes	7,750	15/12/98	100,0	15/01/98
Home Holdings, Inc.	Senior Notes	8,625	15/12/03	178,8	15/01/98
Westbridge Capital Corp.	Senior Sub. Notes	11,000	01/03/02	20,0	15/01/98
Venture Stores, Inc.	Medium Term Notes	Various	Various	60,9	20/01/98
APS Holding Corporation	Senior Sub. Notes	11,875	15/01/06	100,0	02/02/98
Brunos Inc.	Sr. Sub Notes	10,500	01/08/05	400,0	02/02/98
United States Leather Inc.	Senior Notes	10,250	31/07/03	135,0	02/02/98
American Rice Inc.	Mortgage Notes	13,000	31/07/02	100,0	28/02/98
Salant Corporation	Senior Secured Notes	10,500	31/12/98	111,9	28/02/98
Grand Union Co.	Junior Sub. Notes	0,000	02/03/99	7,2	01/03/98
Grand Union Co.	Senior Notes	12,000	01/09/04	595,5	01/03/98
Unison Healthcare Corp.	Senior Notes	12,250	01/11/06	100,0	02/03/98
Unison Healthcare Corp.	Senior Notes	13,000	01/12/99	20,0	02/03/98
Royal Oak Mines, Inc.	Senior Sub. Yankee Note	11,000	15/08/06	175,0	23/03/98
Australis Holdings (b)	Senior Disc. Notes	0,000	01/11/02	80,2	08/04/98
Australis Holdings (c)	Senior Sec. Guar. PIK	15,750	15/05/03	193,1	08/04/98
Heartland Wireless Communications, Inc	Senior Notes	13,000	15/04/03	100,0	15/04/98
Heartland Wireless Communications, Inc	Senior Notes	14,000	15/10/04	125,0	15/04/98
American Telecasting (d)	Senior Disc. Notes	0,000	15/06/04	141,0	13/05/98
American Telecasting (e)	Senior Disc. Notes	0,000	15/08/05	135,9	13/05/98
Cityscape Financial	Senior Notes	12,750	01/06/04	300,0	01/06/98
Geotek Communications (f)	Senior Sec. Disc. Notes	0,000	15/07/05	143,6	30/06/98
CAI Wireless Systems, Inc.	Senior Notes	12,250	15/09/02	275,0	30/07/98
CAI Wireless Systems, Inc.	Senior Notes	12,000	01/10/05	30,0	30/07/98
Renaissance Cosmetics, Inc.	Senior Notes	11,750	15/02/04	200,0	19/08/98
Olympia & York Maiden Lane	Secured Notes	10,375	31/12/95	200,0	31/08/98
International Wireless Communications Holdings (g)	Senior Secured Discount Notes	0,000	15/08/01	139,0	03/09/98
Golden Books Family Entertainment	Senior Notes	7,650	15/09/02	150,0	15/09/98
Acme Metals, Inc. (h)	Senior Disc. Notes	13,500	01/08/04	0,7	28/09/98
Acme Metals, Inc.	Senior Secured Notes	12,500	01/08/02	17,5	28/09/98
Acme Metals, Inc.	Senior Notes	10,875	15/12/07	200,0	28/09/98
Ionica Group PLC	Senior Notes	13,500	15/08/06	150,0	28/09/98
Ionica Group PLC (i)	Senior Discount Notes	0,000	01/05/07	250,0	28/09/98
ERLY Enterprises, Inc.	Subordinated Debentures	12,500	01/12/02	4,9	29/09/98
Southern Pacific Funding Corp.	Senior Notes	11,500	01/11/04	100,0	01/10/98
Criimie Mae, Inc.	Senior Notes	9,125	01/12/02	100,0	03/10/98
National Energy Group	Senior Unsecured Notes	10,750	01/11/06	164,7	02/11/98
AmeriTruck Distribution Corp.	Senior Subordinated Notes	12,250	15/11/05	100,0	09/11/98
Wilshire Financial Services Group Inc.	Senior Notes	13,000	01/01/04	84,2	13/11/98
Wilshire Financial Services Group Inc.	Senior Notes	13,000	15/08/04	100,0	13/11/98
Livent, Inc.	Senior Notes	9,375	15/10/04	125,0	18/11/98
Pioneer Finance Corp. (Santa Fe Gaming)	Guaranteed First Mortgage	13,500	01/12/98	60,0	18/11/98
HealthCor Holdings	Senior Notes	9,375	15/10/04	125,0	30/11/98
Florida Coast Paper Co. LLC	First Mortgage Notes	12,750	01/06/03	165,0	07/12/98
Penn Traffic Company	Senior Notes	8,625	15/12/03	200,0	15/12/98
Penn Traffic Company	Senior Subordinated Notes	9,625	15/04/05	400,0	15/12/98
Penn Traffic Company	Senior Notes	10,250	15/02/02	125,0	15/12/98
Penn Traffic Company	Senior Notes	10,375	01/10/04	100,0	15/12/98
Penn Traffic Company	Senior Notes	10,650	01/11/04	100,0	15/12/98
Penn Traffic Company	Senior Notes	11,500	15/04/06	100,0	15/12/98
P & C Food Markets	Senior Notes	11,500	15/10/01	107,2	15/12/98
			Total	7.463,7	

(a) 63 international issues with an aggregate amount of $9,781.3 million and 14 convertible bond defaults with an aggregate amount of $1,377.5 million are not included. Source: Moody's Investors Services, Inc.

(b) Zero coupon until 11/01/00, 15.00% thereafter. Face value $131.2 million. Accreted value at default $80.2 million.

(c) Secured guaranteed PIK at 1.75 % per month of accreted value to 5/15/00. 15.75% cash coupon thereafter. Face value $343.2 million. Accreted value at default $193.1 million.

(d) Zero coupon until 12/15/99, 14.50% thereafter. Face value $183.0 million. Accreted value at default $141.0 million.

(e) Zero coupon until 8/15/00, 14.50% thereafter. Face value $201.7 million. Accreted value at default $135.9 million.

(f) Zero coupon until 7/15/00, 15.00% thereafter. Face value $207 million. Accreted value at default $143.6 million.

(g) Zero coupon. Face value $196.7 million. Accreted value at default $139.0 million

(h) Zero coupon until 8/97, 13.50% thereafter. Face value $0.7 million. Accreted value at default $0.7 million.

(i) Zero coupon until 2002, 15.00% thereafter. Face value $420.0 million. Accreted value at default $250.0 million.

APPENDIX B

QUARTERLY DEFAULT RATES: HIGH YIELD DEBT MARKET 1989 - 1998

QUARTER		PAR VALUE DEBT OUTSTANDING ($BILLIONS)	DEBT DEFAULTED BY QUARTER ($BILLIONS)	QUARTERLY DEFAULT RATES (%)
1989	1Q	NA	$1,03	NA
	2Q	NA	1,13	NA
	3Q	NA	3,54	NA
	4Q	NA	2,41	NA
			8,11	
1990	1Q	$185,00	$4,16	2,25%
	2Q	$185,00	2,51	1,36%
	3Q	$181,00	6,01	3,32%
	4Q	$181,00	5,67	3,13%
			18,35	
1991	1Q	$182,00	$8,74	4,80%
	2Q	$182,00	2,75	1,51%
	3Q	$183,00	5,01	2,74%
	4Q	$183,00	2,36	1,29%
			18,86	
1992	1Q	$183,20	$3,33	1,82%
	2Q	151,10	1,26	0,83%
	3Q	163,00	0,37	0,23%
	4Q	151,89	0,59	0,39%
			5,55	
1993	1Q	$193,23	$0,38	0,20%
	2Q	193,23	1,33	0,69%
	3Q	206,91	0,05	0,03%
	4Q	190,42	0,52	0,27%
			2,29	
1994	1Q	$232,60	$0,67	0,29%
	2Q	230,00	0,16	0,07%
	3Q	235,00	0,41	0,17%
	4Q	235,00	2,18	0,93%
			3,42	
1995	1Q	$240,00	$0,17	0,07%
	2Q	240,00	1,68	0,70%
	3Q	240,00	0,98	0,41%
	4Q	240,00	1,72	0,72%
			4,55	
1996	1Q	$255,00	$0,44	0,17%
	2Q	$255,00	$0,89	0,35%
	3Q	$271,00	$0,41	0,15%
	4Q	$271,00	$1,59	0,59%
			3,34	
1997	1Q	$296,00	$1,85	0,63%
	2Q	$318,40	$0,60	0,19%
	3Q	$335,40	$1,48	0,44%
	4Q	$335,40	$0,27	0,08%
			$4,20	
1998	1Q	$379,00	$2,37	0,63%
	2Q	$425,70	$1,22	0,29%
	3Q	$465,50	$1,62	0,35%
	4Q	$481,60	$2,26	0,47%
			$7,46	

Notes

(a) Par value at beginning of quarter; NA = Not Available.

Source: Appendix A

APPENDIX C
CORPORATE BOND DEFAULTS BY INDUSTRY
(NUMBER OF COMPANIES)

INDUSTRY	1970-80	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	Total
Auto/Motor Carrier	1		2							3	3					1				10
Conglomerates	0							1	3	1	1	3	3							12
Energy	1		2	3	5	7	12	2	4			4	2	3		1			1	47
Financial Services	2	1	1	1	1	1			4	11	7	14	3	2	1	2	1	2	6	60
Leisure/Entertainment	0							2	4	4	8	2	4	3	4	3	1	5	5	45
General Manufacturing	2		7	1	1	2	6	3	3	1	5	8	8	7	3	8	6	7	6	84
Health Care	0							1	2		2	1	1	1		2			2	12
Miscellaneous Industries	2	1		1	2	6	3	1			4	4	3	1	1	1		3	3	36
Real Estate/Construction	5		2		1	1		1	1	3	7	5	1			2	1	2	1	33
REIT	10		1	1									1							13
Retailing	5		1	1					1	2	6	15	6	4	5	6	3	6	6	67
Communications	6	1		2	2	1	1	3	1		3	4	1	1	3	2	2	1	6	40
Transportation (non auto)	2	1	1	2		1	1			1	1	2			2			2	1	17
Utilities								1	1				1				1	1		5
Total	36	4	17	12	12	19	23	15	24	26	47	62	34	22	19	28	15	29	37	444

Appendix D

WEIGHTED AVERAGE RECOVERY RATES BY INDUSTRY

(1971 - 1998)

Industry	Sample	Weighted Avg. Price	Avg. Price	Price Range		Std.Dev.	Median
				Low	High		
Mining	47	$31,78	$32,93	$9,50	$99,00	$17,85	$32,00
Food & Kindred Products, Tobacco	22	$38,81	$44,83	$14,50	$88,50	$20,16	$43,75
Textile Mill, Apparel & Related Products	37	$39,20	$35,62	$5,00	$89,30	$18,69	$32,88
Lumber, Wood Products, Furniture & Fixtures, Paper & Allied Products	11	$27,96	$32,95	$2,00	$75,00	$25,45	$43,50
Chemical, Petroleum & Energy, Rubber, Plastic & Leather Products	41	$73,74	$59,67	$12,00	$98,75	$28,03	$67,50
Stone, Clay, Glass, Concrete, Metals & Fabricated Products	74	$29,45	$38,16	$2,00	$101,50	$22,84	$35,75
Machinery, Electrical, Electronic & Transportation Equipment, Instruments & Related Products	47	$43,38	$45,48	$4,40	$86,00	$21,83	$44,50
Miscellaneous & Diversified Manufacturing	23	$25,35	$38,32	$1,00	$94,13	$26,63	$31,50
Transportation (Rail Road, Bus, Air, Water, Freight), Pipiline & Transportation Services	49	$40,42	$40,37	$5,00	$103,25	$29,23	$38,00
Printing & Publishing, Communication, and Movie Production	64	$34,45	$36,17	$3,75	$97,00	$21,79	$33,00
Utilities	57	$61,56	$70,01	$17,75	$99,88	$19,78	$79,00
Wholesale & Retail Trade	123	$35,33	$37,24	$0,50	$98,50	$23,01	$36,00
Finance, Insurance & Real Estate	114	$36,57	$36,31	$1,00	$103,00	$26,23	$31,59
Services	68	$43,25	$41,80	$2,00	$112,00	$28,40	$34,25
Total	777	$40,32	$41,66	$0,50	$112,00	$25,89	$37,00

Source: Appendices A and C and Exhibit 5

References

Altman, E. I. (1989b), "Measuring Corporate Bond Mortality and Performance," **Journal of Finance**, vol. XLIV, No. 4, September.

Altman, E. I. and V. Kishore (1996), "Almost Everything You Wanted to Know About Recoveries on Defaulted Bonds," **Financial Analysts Journal**, November/December.

Altman, E. I. and H. Suggitt (1997), "Default Rates in the Syndicated Bank Loan Market: A Mortality Analysis," **NYU Salomon Center, Working Paper Series #S-97-39**.

Altman, E. I., with L. Beltran (1999), "The Performance of Defaulted Bonds and Bank Loans: 1987-1998," NYU Salomon Center Special Report, January.

Caouette, J., E. Altman and P. Narayanan (1998), **Managing Credit Risk: The Next Great Financial Challenge**, John Wiley & Sons, New York.