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*The Investment Performance of Defaulted Bonds for 1987-95 and Market Outlook*

Altman, Edward I. and Anthony C. Morris

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# REPORT ON

## THE INVESTMENT PERFORMANCE OF DEFAULTED BONDS FOR 1987-1995 AND MARKET OUTLOOK

By

Edward I. Altman  
with  
Anthony C. Morris

Dr. Altman is the Max L. Heine Professor of Finance and Vice Director of the NYU Salomon Center, Leonard N. Stern School of Business. Anthony C. Morris is a Ph.D. Student at the Stern School and Research Associate at the Salomon Center. The research assistance of Vellore Kishore, Sanjay Saxena and Brian Wiley is appreciated.



## Report Overview

This report presents a discussion of the investment performance of those bonds that have defaulted and continue trading in the public market while the issuing firm attempts a financial reorganization. Monthly total returns measures are compiled based on the Altman-NYU Salomon Center Index of Defaulted Debt Securities and compared with the total returns of common stocks and high yield bonds. Returns based on our market weighted index are presented for the past year, 1995, as well as the nine year period 1987-1995. 1995 was a modest year of performance for defaulted bonds especially when compared to our two other risky indexes and to risk free government bonds. The return performance of our three indexes for the nine year sample period shows that common stocks are now the number one performer with defaulted bonds in second place followed by high yield bonds. All three asset classes have done quite well in the last decade. Diversification and seasonal movements are also analyzed in this report. Finally, current and future supply estimates for the defaulted and distressed market are presented.



## Introduction

This report on the performance of defaulted bonds continues our annual update and analysis of this unique investment category. For more in-depth discussions of the supply and demand elements of defaulted and distressed securities, as well as their performance, see Altman (1990-1995), Altman and Simon (1995), as well as Altman and Eberhart (1994), and Ward and Griepentrog (1993). Gilson (1995) has also written an excellent primer on bankruptcy and distressed securities. While it still may be premature to refer to distressed and defaulted debt securities as an asset class or market, especially in view to the diminished size of the market in 1995, we are confident that investment attention in defaulted securities will not only continue but will increase in the future. In the final analysis, there will always be a market for the buying and selling of securities of problem firms which afford opportunities for considerable and greater price appreciation than more typical corporate debt securities.

## Monitoring Performance

In order to monitor the performance of defaulted debt securities, a measure called the Altman-NYU Salomon Center Index of Defaulted Debt Securities (A-NYU Index) was developed.<sup>1</sup> The Index

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<sup>1</sup>This index, originally developed in Altman's Foothill Report (1990) and later maintained and published on a monthly basis at the NYU Salomon Center of the Leonard N. Stern School of Business is available via the Center 212/998-0701 as well on a number of electronic and other data services.

starts in December 1986=100 and as of December 31, 1995 was comprised of 50 issues (27 companies) with a market value of \$2.2 billion and a face value of its component securities of \$5.0 billion. The 1995 totals are considerably reduced from the recent past and are more reminiscent of the size of the Index in the late 1980's. Exhibit 1 shows the size of the Index at year-end since its inception in 1986. Note the variability in number of issues from as low as 30 in 1986 to as high as 231 in 1992. We are confident, however, that the size of the Index, as measured by market values and number of issues, will increase in the coming years as defaults begin to rise (see the section on future supply at the end of this report).

The A-NYU Index includes securities of companies at various stages of the bankruptcy-reorganization process -- from just after default up to when the bankrupt firm either emerges from Chapter 11, is liquidated or until the default is "cured" or resolved through an exchange. The Index includes issues of all seniorities, from senior-secured to junior-unsecured debt. A study by Altman and Eberhart (1994) assesses the performance of defaulted debt from the time of original issuance through default and to emergence from bankruptcy. That study concluded that the seniority of the issue is an extremely important determinant of the performance of defaulted debt for specific periods, i.e., from issuance to emergence. (Note that the A-NYU Index does not include convertible issues).



## 1995 Performance

The Altman-NYU Salomon Center Index continued its upswing in 1995, rising by 11.3%, surpassing 1994's relatively poor year (+6.66%) but below that of the prior three years (1991-1993). The Index level rose from 251.5 at the end of 1994 to 279.8 at the end of 1995.

The decent overall performance of defaulted debt securities, however, was considerably less than the total return of the S&P Common Stock Index (+37.6% - assuming reinvestment of dividends), the Merrill Lynch High Yield Debt Master Index (+19.9%) and the 10-year U.S. Government Bond (+23.9%). In general, all fixed income securities did extremely well in 1995 as interest rates decreased throughout the year and the longer duration 10-year U.S. Government securities performed the best. Defaulted securities, on the other hand, are not very sensitive to interest rate changes except as it affects the future earning power of the firm after it emerges (if it does) from reorganization.

## Nine Year Comparative Performance

In Exhibit 2 we observe the return on defaulted debt securities as well as common stocks and high yield bonds for the entire nine year sample period, 1987-1995. Note that both the arithmetic average (14.3% per year) and the geometric average (12.1% per year) for defaulted debt is now less than the S&P 500 (compared to last year's cumulative return when it was slightly

greater) but still higher than the high yield bond index for the same period. In five of the nine years, defaulted debt securities performed better than both of the other two indexes while in three years it performed the worst. Hence the volatility of the annual returns appears to be greater. On a monthly basis, however, the volatility comparison, as measured by the standard deviation of returns, is considerably different with defaulted debt issues actually showing lower volatility (3.67%) than common stocks (4.27%) but still higher than high yield "junk" bonds (1.64%). The latter differential actually narrowed in 1995 compared to year-end 1994.

Exhibit 3 graphs the monthly index levels for our three security classes for the entire nine year period. In March 1995, the S&P index level once again rose above the two others. The higher volatility period for defaulted bonds was clearly in the earlier years of our time series, 1987-1989.

### **Diversification Attributes: Risky Asset Returns Correlations**

One of the potential strategies suggested by our analysis is to include defaulted debt in a larger portfolio of risky securities. Some domestic pension funds and foreign portfolios have, in effect, taken this approach by allocating a proportion of their total investments to defaulted debt money managers. Almost all portfolio managers involved in the distressed market have been specialists in the sector, rather than investors in distressed bonds within broader-based portfolios. Therefore, the avenue for

diversification appears to be primarily through the use of different investment managers.<sup>2</sup> And, a number of "Fund-of-Funds" which have adopted this strategy, have also chosen distressed securities managers with different styles including active, semi-active and passive approaches (see Altman 1991 for a discussion of strategies).

Exhibit 4 demonstrates the correlations between the Altman-NYU Index and the other two risky asset classes -- common stocks and high yield bonds. We see that the monthly return correlation is only 0.36 between risky defaulted debt and equities. Since defaulted debt holders usually end up owning the equity of the emerged Chapter 11 entity, unless they sell the debt just prior to emergence from restructuring, it is interesting to note the somewhat low correlation of returns between these two indexes. Furthermore, the quarterly correlations are even lower (0.25).

The correlation between high yield bonds and defaulted bonds is quite high at about 0.57 (monthly) and 0.62 (quarterly). We believe that the relatively high correlation is partially a function of the operating performance of firms in general, the outlook for risky companies and the overall confidence in the market for risky debt. While these correlations are quite high, it is also clear that the defaulted debt index is more volatile -- in both good and bad years. This is not surprising since high yield debt has a base return equal to the interest payments received in

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<sup>2</sup>There are some rare exceptions whereby a mutual fund combines investments in more traditional debt and equity securities with distressed securities.

each period while most defaulted debt trades "flat" (without interest receipts). In addition, there is a great deal of uncertainty about what the reorganization plan will specify and how each class of creditors will be treated -- not to mention the possibility that the end-result will be a liquidation. Finally, there are several critical event dates during a bankruptcy reorganization, i.e., bankruptcy filing, post-default financing, filing of a reorganization plan and plan confirmation/liquidation, which can result in large swings in the price of debt issues.

We do observe that the relative volatility between defaulted debt and equity returns, when measured on a monthly basis, puts the former in a much more favorable light. This implies a greater degree of autocorrelation (strings of gains or losses) which can exacerbate annual return levels and volatility but not monthly return variability.

Exhibit 2 also shows that in most above-average years (1987, 1988, 1991, and 1993), defaulted debt outperformed high yield debt, while in poor years (1989 and 1990), defaulted debt performed far worse. In 1995, however, high yield debt actually performed better than defaulted debt in a relatively good year. This accounts for the somewhat diminished relative volatility of defaulted debt vis-a-vis our other two indexes.

### Seasonality?

A curious pattern continued in 1995 concerning the monthly and quarterly returns of defaulted debt. In every year of our,

admittedly short, nine-year data base, the best performing quarter came within the first six months of the year while the worst performing month and quarter were in the last six months (Exhibit 5). Indeed, the first quarter was the best in seven out of the nine years, including 1995. In addition, the worst quarter was the last in six out of the nine years.

These patterns may not be simply coincidental. Perhaps the generally poor end-of-year performance can be partially explained by the portfolio "clean-up" by managers. That is, unattractive vestiges of earlier-in-the-year bankruptcies are dumped by managers of high yield funds who do not want defaults in the portfolio at all. This, of course, presents some attractive opportunities for defaulted debt managers for above normal short term returns in the following months.

Is there a January effect caused by the end-of-year poor performance and tax-selling? Perhaps not, since January was the best performing month only in 1992 and 1993, second best in 1987 and 1994 and overall a positive month in six of the nine years. On the other hand, the first quarter was a stellar period, as noted above. While these results are striking and invite further study, we cannot say more at this point without investigating the performance of individual firms' issues.

## Outlook for the Supply and Demand of Distressed Securities

For this report, we have analyzed the size of the defaulted and distressed debt market although we have not done a formal survey of investment managers who specialize in distressed and defaulted securities. We observe that there has been a considerable reduction in the size of the public and private distressed debt market and this is certainly clear in the diminution in the size of our defaulted debt index. Again, from Exhibit 1, we see that the market value of our index in 1995 compared to 1993 fell by 60% from \$5.8 billion to \$2.3 billion and the number of issues dropped from 151 to 50 (67%). The supply of new defaults clearly did not keep pace with those firms that have emerged in one form or another from their distressed restructuring status. In one case, the Columbia Gas System's emergence from Chapter 11 at the end of November 1995 resulted in a drop in the market value of our Index by almost \$1 billion and by 20 issues. Since all of the Columbia Gas System's bonds were selling at above par value, the ratio of market value to face value of our Index fell to 44.2% -- a fairly typical ratio. Also, the relatively low default rate in 1995 of about 1.9% (Exhibit 6) did not add sizeable amounts to our Index.

As for the future, we expect the market for distressed and defaulted securities to increase considerably. The overall U.S. economy is beginning to show signs of weakness. And, the huge new issue supply of non-investment grade debt in the last four years of over \$150 billion should result in an increase of default amounts

in the coming years. While we do not expect default rates and numbers to approach the record years of 1990 and 1991, or even to reach the weighted average levels of 1991-1995 (3.9% per year) the net supply of distressed and defaulted issues will almost certainly 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 the expected larger number of new defaults.

### **Current Supply and Outlook For Future Amounts of Defaulted Debt Securities**

In prior work, our estimates of the size of the distressed and defaulted debt market were as high as \$300 billion (face value) and \$200 billion (market value) at the start of 1990 (Exhibit 7). The large amount of distressed public debt at that time (\$50 billion) resulted in record default totals in the next two years, swelling our Index to as much as 231 individual issues in 1992 and defaulted publicly traded debt to \$42.6 billion by August 1992. Since that date, the size of the market has diminished consistently. This data includes public and private debt estimates. The private debt total was estimated by applying a multiplier of as high as three times the public debt in 1990 and as low as 1.85-to-one in 1992. Both of these estimates are based on empirical observations of several hundred bankrupt firms' balance sheets (Altman 1990 and 1993). Since we have not had the opportunity to do an in-depth analysis of this ratio of private to public debt since 1992, we will use an

estimate of 2:4 to 1 -- approximately the mid-point between the two prior estimates.

As of June 30, 1995, we estimated that the public defaulted and distressed markets had face values of \$16.5 billion and \$13.3 billion respectively (Exhibit 7). Using the aforementioned multiplier of 2.4 for private debt, the private totals are \$39.6 billion (defaulted) and \$31.9 billion (distressed). We are quite confident that, on average, defaulted public debt, which is a mixture of senior and subordinated securities, sells for about 50% of face value and public distressed debt for about 60% of face value. Private defaulted debt, which is predominantly senior in priority, is estimated to sell at 60% of face value and private distressed debt at 75% of face value. Hence, the most current (June 1995) estimate of total public and private, defaulted and distressed debt, is about \$100 billion (face) and \$64 billion (market). These figures do not include non-U.S. debt, e.g., Canadian, U.K. and some European corporates.

## **Future Supply**

A critical question for the distressed security investor, sometimes called a "vulture", is the likely supply of new defaulted and distressed paper, i.e., the expected raw material for possible future investments. While we do not use a formal econometric model for predicting near term default rates, 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.<sup>3</sup> A method for doing just this is the mortality rate approach, first developed in the late 1980's (Altman 1989) and updated each year. Mortality rates, based on new issuance from 1971-1994 and defaults through 1995, are given in Exhibit 8.

Based on actual new issuance by bond rating from 1986-1995 and the mortality rate data in Exhibit 8, we estimate that new publicly traded bond default totals will be approximately \$25.9 billion over the next three years (Exhibit 9). Due to the high proportion of senior bonds issued in the high yield debt market since 1990 - about 70 percent of the total new issuance - the expected average price of default is about 45% of par value (compared to the venerable 40% for all defaults). This implies a market value estimate of about \$11.7 billion of new public defaults over the period 1996-1998 (Exhibit 10). These public defaults will probably be accompanied by new private defaulted debt face value totals of about \$62 billion. This is based on a 2.4 to 1.0 ratio of private to public. The resulting expected total of public and private defaulted debt at face value is therefore approximately \$88.1 billion, \$49.0 billion market value. Incidentally, although these numbers look quite large, the resulting implied default rate in the U.S. high yield debt market is approximately 3.2-3.4% per year - below the historical annual weighted average of 3.9%.

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<sup>3</sup>Fridson and Jonsson (1995) survey a number of default rate prediction models and present their own approach.



## Exhibit 1

**Size of the A-NYU Defaulted Debt Index  
(1986-1995)**

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<u>Year End</u>	<u>Number of Issues</u>	<u>Number of Firms</u>	<u>Face Value (\$ Billions)</u>	<u>Market Value (\$ Billions)</u>
1986	30	10	1.7	0.5
1987	53	18	5.7	4.2
1988	91	34	5.2	2.7
1989	111	35	8.7	3.4
1990	173	68	18.7	5.1
1991	207	80	19.6	6.1
1992	231	90	21.7	11.1
1993	151	77	11.8	5.8
1994	93	35	6.3	3.3
1995	50	27	5.0	2.3

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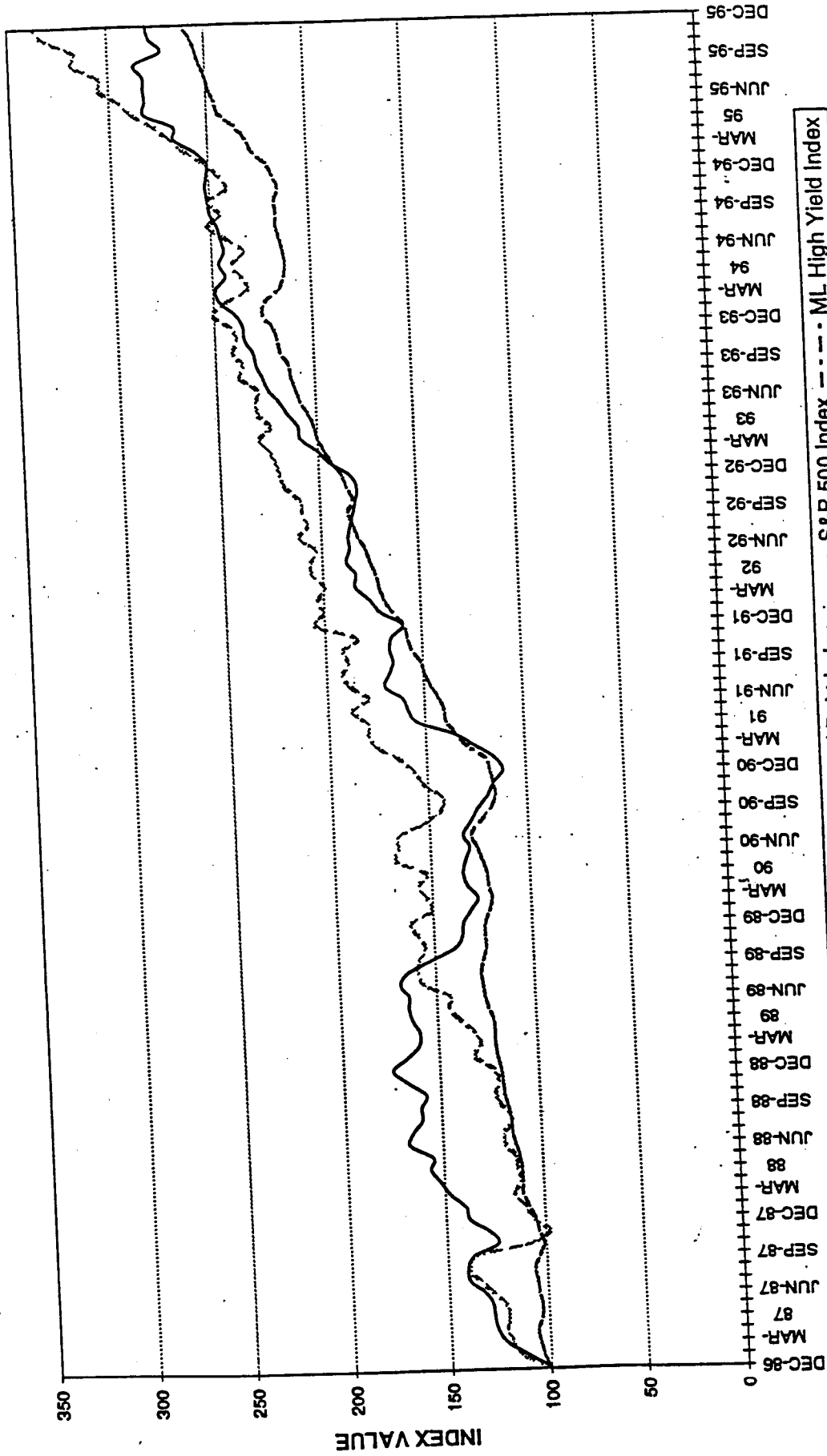
## EXHIBIT 2

ALTMAN-NYU SALOMON CENTER INDEX OF DEFAULTED  
DEBT SECURITIES AND OTHER SPECULATIVE SECURITIES INDEXES

Comparison of Returns  
(1987 - 1995)

Year	Altman-NYU Salomon Center Index (Mkt. Weighted)	S&P 500 Stock Index	Merrill Lynch High Yield Master Index
1987	37.85%	5.26%	4.67%
1988	26.49%	16.61%	13.47%
1989	-22.78%	31.68%	4.23%
1990	-17.08%	-3.12%	-4.35%
1991	43.11%	30.48%	34.58%
1992	15.39%	7.62%	18.16%
1993	27.91%	10.08%	17.18%
1994	6.66%	1.32%	-1.16%
1995	11.26%	37.58%	19.91%
<hr/>			
1987 - 1995 Arithmetic Average (Annual) Rate	14.31%	15.28%	11.85%
Standard Deviation	22.77%	14.66%	12.22%
1987 - 1995 Compounded Average (Annual) Rate	12.11%	14.47%	11.27%
<hr style="border-top: 1px dashed black;"/>			
1987 - 1995 Arithmetic Average (Monthly) Rate	1.02%	1.23%	0.91%
Standard Deviation	3.67%	4.27%	1.64%
1987 - 1995 Compounded Average (Monthly) Rate	0.96%	1.13%	0.89%

EXHIBIT 3  
DEFAULTED DEBT, STOCK, AND HIGH YIELD BOND INDICES  
1987-1995



**EXHIBIT 4****CORRELATION OF ALTMAN-NYU SALOMON CENTER INDEX  
OF DEFAULTED SECURITIES WITH OTHER SPECULATIVE  
SECURITIES INDEXES 1987 - 1995**CORRELATION OF MONTHLY RETURNS

	Altman-NYU Salomon Center Index	S&P 500 Stock Index	Merrill Lynch High Yield Master Index
Altman-NYU Salomon Center Index	100.00%	35.63%	57.00%
S&P 500 Stock Index		100.00%	48.61%
Merrill Lynch High Yield Master Index			100.00%

CORRELATION OF QUARTERLY RETURNS

	Altman-NYU Salomon Center Index	S&P 500 Stock Index	Merrill Lynch High Yield Master Index
Altman-NYU Salomon Center Index	100.00%	25.48%	62.54%
S&P 500 Stock Index		100.00%	47.06%
Merrill Lynch High Yield Master Index			100.00%

## EXHIBIT 5

MONTHLY AND QUARTERLY RETURNS FOR THE  
ALTMAN-NYU SALOMON CENTER INDEX OF DEFAULTED SECURITIES

Month	1987	1988	1989	1990	1991	1992	1993	1994	1995	Rank	Rank	Rank	Rank	Rank	Rank	Rank	Rank	Rank	Up	Down
Jan	9.80%	1.44%	-4.47%	-2.91%	3.18%	7.06%	5.55%	1.43%	-0.22%	8	5	1	2	11	6/9	3/9				
Feb	10.53%	5.44%	-3.99%	-2.83%	8.49%	3.21%	3.09%	3.20%	2.17%	7	3	3	1	3	7/9	2/9				
Mar	3.77%	3.10%	-0.21%	3.98%	8.50%	3.90%	4.16%	0.76%	4.23%	1	2	2	5	2	8/9	1/9				
Apr	1.25%	3.18%	2.06%	1.48%	13.62%	-0.27%	0.27%	-2.04%	0.09%	3	1	11	12	8	7/9	2/9				
May	0.44%	-0.91%	1.01%	-1.23%	2.99%	2.57%	2.54%	1.19%	5.42%	4	6	4	4	1	7/9	2/9				
Jun	2.90%	7.41%	-0.09%	-1.71%	1.66%	-1.05%	1.80%	-1.06%	-0.18%	5	7	6	11	10	4/9	5/9				
Jul	5.50%	-1.14%	2.46%	2.29%	5.39%	0.25%	2.55%	0.47%	0.18%	2	4	5	8	7	8/9	1/9				
Aug	0.52%	-2.82%	-2.06%	-3.03%	-1.30%	-0.72%	1.13%	0.74%	0.03%	10	10	9	6	9	4/9	5/9				
Sep	-2.45%	-0.07%	-7.84%	-2.99%	-1.45%	-0.93%	1.30%	1.40%	1.55%	9	11	8	3	5	3/9	6/9				
Oct	-8.92%	-1.61%	-8.40%	-4.28%	1.08%	-0.82%	0.64%	0.29%	-4.70%	12	8	10	9	12	3/9	6/9				
Nov	3.22%	5.83%	-2.64%	-2.69%	-0.92%	-0.41%	1.76%	0.50%	1.97%	6	9	7	7	4	5/9	4/9				
Dec	7.53%	4.48%	-0.70%	-4.27%	-3.53%	1.97%	0.23%	-0.30%	0.52%	4	12	12	10	6	5/9	4/9				
1st Q	25.95%	10.28%	-8.47%	-1.90%	21.45%	14.79%	13.33%	5.47%	6.26%	1	1	1	1	1	7/9	2/9				
2nd Q	4.65%	9.82%	3.00%	-1.49%	18.96%	1.21%	4.67%	-1.93%	5.33%	2	2	3	4	2	7/9	2/9				
3rd Q	3.46%	-3.99%	-7.51%	-3.77%	2.51%	-1.39%	5.06%	2.63%	1.76%	3	4	2	2	3	5/9	4/9				
4th Q	1.10%	8.78%	-11.44%	-10.83%	-3.38%	0.72%	2.65%	0.48%	-2.32%	4	3	4	3	4	5/9	4/9				
Annual	37.85%	26.49%	-22.78%	-17.08%	43.11%	15.39%	27.91%	6.66%	11.26%						7/9	2/9				

HISTORICAL DEFAULT RATES - STRAIGHT DEBT ONLY  
EXCLUDING DEFAULTED ISSUES FROM PAR VALUE OUTSTANDING  
1971 - 1995 (\$ MILLIONS)

<u>YEAR</u>	<u>PAR VALUE OUTSTANDING</u>	<u>PAR VALUE DEFAULTS</u>	<u>DEFAULT RATES</u>	
1995	\$240,000	\$4,551	1.896%	
1994	235,000	3,418 (a/b)	1.454% (a/b)	
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 (c)	5.778% (c)	
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%	
				<b>Standard Deviation</b>
<b>ARITHMETIC AVERAGE DEFAULT RATE</b>		<b>1971 TO 1995</b>	<b>2.723%</b>	<b>2.623%</b>
		<b>1978 TO 1995</b>	<b>3.028%</b>	<b>2.906%</b>
		<b>1985 TO 1995</b>	<b>4.200%</b>	<b>3.116%</b>
<b>WEIGHTED AVERAGE DEFAULT RATE (d)</b>		<b>1971 TO 1995</b>	<b>3.933%</b>	<b>3.226%</b>
		<b>1978 TO 1995</b>	<b>3.990%</b>	<b>3.244%</b>
		<b>1985 TO 1995</b>	<b>4.203%</b>	<b>3.258%</b>
<b>MEDIAN ANNUAL DEFAULT RATE</b>		<b>1971 TO 1995</b>	<b>1.708%</b>	

**Notes**

- (a) Includes Grand Union debt of \$1,271.0 million and Trans World Airlines debt of \$231 million in 1994 defaults; if both were not included, the default rate would be 0.64%.
- (b) Amount of defaults in 1994 adjusted for accreted value of two TWA issues and two Grand Union issues.
- (c) \$1,841.7 million without Texaco, Inc., Texaco Capital, and Texaco N.V.; If not included, the default rate is 1.345%.
- (d) Weighted by par value of amount outstanding for each year.



Exhibit 7 Estimated Face and Market Values of Defaulted and Distressed Debt (1990-1995) (\$Billions)

	January 31, 1990		August 31, 1992		August 31, 1993		June 30, 1995	
	Face Value	Market Value	Face Value	Market Value	Face Value	Market Value	Face Value	Market Value
Public Debt:								
Defaulted	\$25.0	\$11.4	\$42.6	\$20.5	\$31.5	\$15.8	\$16.5	\$ 8.3
Distressed	50.0	33.0	28.4	16.5	15.6	9.4	13.3	8.0
<b>Total Public</b>	<b>76.0</b>	<b>44.4</b>	<b>71.0</b>	<b>37.0</b>	<b>47.1</b>	<b>25.1</b>	<b>29.8</b>	<b>16.3</b>
Private Debt:								
Defaulted	78.0 <sup>1</sup>	46.8	78.8 <sup>2</sup>	47.3	75.6 <sup>3</sup>	43.4	39.6 <sup>3</sup>	23.8
Distressed	150.0 <sup>1</sup>	112.5	52.5 <sup>2</sup>	39.4	37.4 <sup>3</sup>	28.1	31.9 <sup>3</sup>	23.9
<b>Total Private</b>	<b>228.0</b>	<b>159.3</b>	<b>131.4</b>	<b>86.7</b>	<b>113.0</b>	<b>71.5</b>	<b>71.5</b>	<b>47.7</b>
<b>Total Public &amp; Private</b>	<b>\$304.0</b>	<b>\$203.7</b>	<b>\$202.4</b>	<b>\$123.7</b>	<b>\$160.1</b>	<b>\$ 96.6</b>	<b>\$101.3</b>	<b>\$ 64.0</b>

<sup>1</sup> Assumes 3-to-1 ratio of private to public debt

<sup>2</sup> Assumes 1.85-to-1 ratio of private to public debt

<sup>3</sup> Assumes 2.4-to-1 ratio of private to public debt

Sources: E. ALTMAN (1994) and recent estimates from Salomon Brothers, Inc. and Merrill Lynch & Company

## Exhibit 8

## MORTALITY RATES BY ORIGINAL RATING - ALL RATED CORPORATE BONDS\*

(1971 - 1995)

Years after issuance

	1	2	3	4	5	6	7	8	9	10
AAA	0.00%	0.00%	0.00%	0.00%	0.07%	0.00%	0.00%	0.00%	0.00%	0.00%
Cumulative	0.00%	0.00%	0.00%	0.00%	0.07%	0.07%	0.07%	0.07%	0.07%	0.07%
AA	0.00%	0.00%	0.54%	0.31%	0.00%	0.00%	0.01%	0.00%	0.05%	0.05%
Cumulative	0.00%	0.00%	0.54%	0.84%	0.84%	0.84%	0.85%	0.85%	0.89%	0.94%
A	0.00%	0.00%	0.06%	0.18%	0.08%	0.18%	0.07%	0.15%	0.12%	0.00%
Cumulative	0.00%	0.00%	0.06%	0.24%	0.32%	0.50%	0.58%	0.73%	0.85%	0.85%
BBB	0.03%	0.39%	0.53%	0.68%	0.47%	0.60%	0.24%	0.13%	0.12%	0.67%
Cumulative	0.03%	0.42%	0.94%	1.62%	2.09%	2.68%	2.91%	3.04%	3.16%	3.80%
BB	0.50%	0.98%	4.03%	1.49%	3.34%	1.37%	3.02%	0.29%	2.15%	4.20%
Cumulative	0.50%	1.48%	5.45%	6.86%	9.97%	11.20%	13.88%	14.13%	15.98%	19.51%
B	1.29%	4.29%	6.90%	6.69%	7.29%	6.24%	4.13%	2.38%	1.58%	1.88%
Cumulative	1.29%	5.53%	12.05%	17.93%	23.91%	28.66%	31.60%	33.23%	34.29%	35.52%
CCC	2.54%	17.25%	18.96%	11.80%	3.75%	9.82%	1.69%	5.71%	0.00%	10.11%
Cumulative	2.54%	19.34%	34.64%	42.35%	44.51%	49.96%	50.81%	53.62%	53.62%	58.31%

\* Rated by S & P at Issuance  
Based on 606 issues

## Exhibit 9

**Expected Supply of New Defaulted Debt: US Only - Face Values  
(Public and Private Markets: 1996-1998)  
[\$Billions]**

	<u>1996</u>	<u>1997</u>	<u>1998</u>	<u>Totals</u>
Public Defaulted Debt	\$ 8.36	\$ 8.64	\$ 8.91	\$25.91
Private Defaulted Debt*	20.06	20.74	21.38	62.18
Total	<u>\$28.42</u>	<u>\$29.38</u>	<u>\$30.29</u>	<u>\$88.09</u>

\*Assumes Private/Public ratio of 2.4

Estimates are based on marginal mortality rates (from Altman [1989] and Altman & Kishore [1995], new corporate bond issuance 1986-1995 and extrapolation of new issuance, by bond rating, for 1996 and 1997 based on last ten year averages.

Source: Professor Edward I. Altman, NYU Salomon Center, Stern School of Business.

**Exhibit 10**

**Expected Supply of New Defaulted Debt (U.S. Only, 1996-1998)**

Debt Type	Defaulted Debt Par Value (\$Billion)	Defaulted Debt Market Value (\$Billion)
Public Straight Debt	\$25.9	\$11.7*
Private Senior Debt**	\$62.2	\$37.3
<b>Total</b>	<b>\$88.1</b>	<b>\$49.0</b>

\*Assumes market value at default at 0.45 of face value.

\*\*Assumes private/public ratio of 2.4; market value at default at 0.60 of face value.

Source: Professor Edward I. Altman, NYU Salomon Center, Stern School of Business.

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