

**New York University Salomon Center
Leonard N. Stern School of Business**

Special Report on

**The Investment Performance and Market Size of
Defaulted Bonds and Bank Loans:
2006 Review and 2007 Outlook**

by

Edward I. Altman

with

Jeffrey Swanson

February 2007

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Acknowledgments

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The year 2006 was a very impressive one for distressed debt investments, with returns that were well above average and strategies that were successful in the face of what appeared to be a fully priced market at the year's outset. The return of the Combined Altman NYU Salomon Center Index was 23.40%. This long-only, gross return (no fees or transaction costs included) index was paced by an exceptionally strong performance from defaulted bonds which compensated for a lackluster return on defaulted loans. The Combined Index outpaced the good performances of the S&P 500 Stock Index (+15.80%) and Citigroup's High-Yield Bond Index (+11.85%).

The Altman Defaulted Bond Index performed considerably better than last year and also versus our Defaulted Loan Index. The long-only defaulted bond index was up by 35.62%, the fourth highest annual performance since our performance measures began in 1987 (20 years). Defaulted bank loans, on the other hand, performed relatively poorly at 4.35%, below its annual historical average since 1996.

The market-to-face-value ratio of defaulted bonds soared to an all time high of 75%, an increase of 16% over the 2005 figure. This increase was paced by both the recovery rate on newly defaulted bonds (about 65%) and an impressive increase in the price of existing defaulted issues. This was especially true in the automotive parts and airline industries. The market to face value ratio of defaulted bank loans increased slightly to 89% from 86% at the end of 2005.

The benign credit market continued with historically relatively low default rates on high yield bonds (0.76%) and leveraged loans (1.07%) – both dollar denominated measures. This low amount of defaults combined with higher amounts of emergencies from reorganization and a significant dip in the distress ratio caused the size of the face value of the combined public and private, defaulted and distressed debt market to fall by over \$50 billion from 2005 to \$627 billion. Market values increased by \$15 billion, however, as prices on existing and newly defaulted bonds and loans increased. The market value size as of year-end 2006 was estimated at about \$525 billion.

Demand from the over 170 institutional distressed debt investors was very strong and varied strategies included traditional passive buy-and-hold and arbitrage plays, direct lending to distressed companies, active-control elements, foreign investing, emerging equity purchases and even equity plays while the firms are going through reorganization in bankruptcy. Leveraged investing was also quite evident.

Based on the Altman models' forecast of increasing default rates in 2007 and 2008, we expect that the size of the defaulted and distressed markets will increase considerably in the next two years as both new defaults and an increasing distress ratio add to the supply of distressed debt. Demand should also increase as commitments to distressed debt hedge funds and private equity strategies become invested. Investors will be hard pressed, however, to match returns realized in 2006.

Measuring and Monitoring Performance of Defaulted Bonds

Defaulted Bond Index

The Altman-NYU Salomon Center Defaulted Bond Index was developed in 1990 for the purpose of measuring and monitoring the performance of defaulted debt securities.¹ This work was complemented two years later by an analysis of the distressed bank loan market.² The performance statistics on bonds went back to 1987 and a later time series on defaulted loans was started in 1996. As of December 31, 2006, the number of issues in our defaulted bond index was 85, down 13 from last year's figure and less than one half the number of its previous highs in the early 1990s and again in 2001 (Figure 1). The number of firms supplying defaulted bonds at year-end 2006 was just 36, about the same as last year. This implies a similar number of entrances and exits amongst defaulted companies.

Because of the impressive increase in prices of both existing and newly defaulted bonds in 2006, the market value of our Index actually increased by almost \$6 billion and the market/face value ratio increased to a record high level, 0.75. The current market value of defaulted bonds in our Index is also at a record high level, eclipsing the past high point in 2003.

Figure 1. Size of the Altman-NYU Salomon Center Defaulted Bond Index, 1987–2006

| Year-End | Number of Issues | Number of Firms | Face Value (\$ Billions) | Market Value (\$ Billions) | Market/Face Ratio |
|----------|------------------|-----------------|--------------------------|----------------------------|-------------------|
| 1987 | 53 | 18 | 5.7 | 4.2 | 0.74 |
| 1988 | 91 | 34 | 5.2 | 2.7 | 0.52 |
| 1989 | 111 | 35 | 8.7 | 3.4 | 0.39 |
| 1990 | 173 | 68 | 18.7 | 5.1 | 0.27 |
| 1991 | 207 | 80 | 19.6 | 6.1 | 0.31 |
| 1992 | 231 | 90 | 21.7 | 11.1 | 0.51 |
| 1993 | 151 | 77 | 11.8 | 5.8 | 0.49 |
| 1994 | 93 | 35 | 6.3 | 3.3 | 0.52 |
| 1995 | 50 | 27 | 5.0 | 2.3 | 0.46 |
| 1996 | 39 | 28 | 5.3 | 2.4 | 0.45 |
| 1997 | 37 | 26 | 5.9 | 2.7 | 0.46 |
| 1998 | 36 | 30 | 5.5 | 1.4 | 0.25 |
| 1999 | 83 | 60 | 16.3 | 4.1 | 0.25 |
| 2000 | 129 | 72 | 27.8 | 4.3 | 0.15 |
| 2001 | 202 | 86 | 56.2 | 11.8 | 0.21 |
| 2002 | 166 | 113 | 61.6 | 10.4 | 0.17 |
| 2003 | 128 | 63 | 36.9 | 17.7 | 0.48 |
| 2004 | 104 | 54 | 32.1 | 16.9 | 0.53 |
| 2005 | 98 | 35 | 29.9 | 17.5 | 0.59 |
| 2006 | 85 | 36 | 31.2 | 23.3 | 0.75 |

Source: NYU Salomon Center Defaulted Bond Database.

¹ This index, originally developed in Altman's Foothill Report (1990), is maintained and published on a monthly basis at the NYU Salomon Center of the Leonard N. Stern School of Business. It is available, by subscription, from the Center (212) 998-0701 or (212) 998-0709.

² E. Altman (1992), "The Market For Distressed Securities and Bank Loans", The Foothill Group, Los Angeles, CA.

Defaulted Bank Loan Index

The other major market in defaulted debt securities, bank loans, did not enjoy the same exceptional experience in 2006. Indeed, as can be seen in Figure 2, the number of issues, face value and market values all declined in 2006 and, as discussed earlier, performance was lackluster. Despite these performance and size decreases in both face and market values, the important market/face value ratio increased somewhat to an all-time record high of 0.89 (interim months in 2006 actually saw this ratio rise above 0.90). One wonders how much higher this ratio can go.

Figure 2. Size of the Altman-NYU Salomon Center Defaulted Bank Loan Index, 1995–2006 (Dollars in Billions)

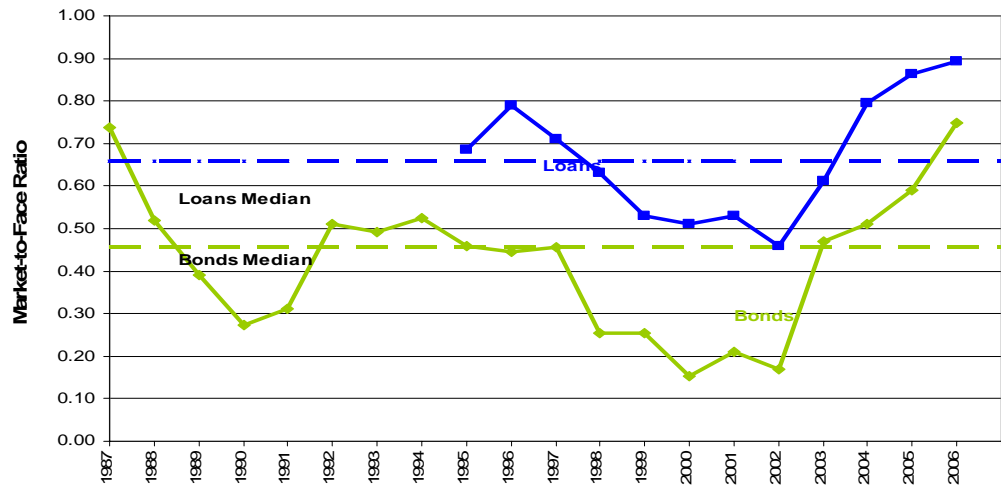
| Year-End | Number of Issues | Number of Firms | Face Value (\$ Billions) | Market Value (\$ Billions) | Market/Face Ratio |
|----------|------------------|-----------------|--------------------------|----------------------------|-------------------|
| 1995 | 17 | 14 | 2.9 | 2.0 | 0.69 |
| 1996 | 23 | 22 | 4.2 | 3.3 | 0.79 |
| 1997 | 18 | 15 | 3.4 | 2.4 | 0.71 |
| 1998 | 15 | 13 | 3.0 | 1.9 | 0.63 |
| 1999 | 45 | 23 | 12.9 | 6.8 | 0.53 |
| 2000 | 100 | 39 | 26.9 | 13.6 | 0.51 |
| 2001 | 141 | 56 | 44.7 | 23.8 | 0.53 |
| 2002 | 64 | 51 | 37.7 | 17.4 | 0.46 |
| 2003 | 76 | 43 | 39.0 | 23.9 | 0.61 |
| 2004 | 45 | 26 | 22.9 | 18.2 | 0.80 |
| 2005 | 41 | 21 | 18.7 | 16.2 | 0.86 |
| 2006 | 27 | 23 | 11.2 | 10.0 | 0.89 |

Source: NYU Salomon Center Defaulted Bank Loan Index Database.

Market-to-Face-Value Ratios

Figure 3 shows the time series trend in the market-to-face value ratios of defaulted bonds and bank loans. The unmistakable increasing trend since the depth-years of 2000-2002 depicts a fully priced market. This implies that if investors will continue to enjoy above average returns, they must do so in either special situations, non-traditional distressed strategies, equities, foreign opportunities, or the increased use of leverage. Of course, if the recovery rate on new defaults in 2007/2008 tumbles, new opportunities in traditional defaulted securities will perhaps materialize. Recall, that our indexes are a long-only, fully invested strategy just in *defaulted* securities (not distressed bonds/selling at least 1000 bp over Treasuries or bank loans selling at a discount, or equities, etc).

Figure 3. Altman-NYU Salomon Center Default Debt Indexes — Market-to-Face Value Ratios, Annual 1987–2006



Note: The loans median market to face value is 0.66 and average market to face value is 0.67. Bonds median market to face value is 0.46 and the average market to face value is 0.42.

Source: Figures 1 and 2 from the NYU Salomon Center's Defaulted Bond and Bank Loan database.

Performance Measurement

Our indexes include the securities of firms at various stages of reorganization either in bankruptcy or restructuring. We calculate the returns for the Index using data compiled from just after default to the point when the bankrupt firm emerges from Chapter 11, is liquidated, or until the default is “cured” or resolved through an exchange. The Bond Index includes issues of all seniorities, from senior-secured to junior unsecured debt. A study by Altman and Eberhart (1994), updated by Standard & Poor’s (Brand and Behar, 2000), measures the performance of defaulted debt from the time of original issuance through default and then to emergence from bankruptcy. These studies found that seniority of the issue is an extremely important characteristic of the performance of defaulted securities over specific periods, whether from issuance to emergence or from default to emergence.

Our indexes do not include convertible or non-US and Canadian company issues, nor do they include distressed, but not defaulted, securities. And, as noted, the performance measure is based on a fully invested, long-only strategy. Returns are calculated from individual bond and bank loan security movements; they are not based on some average performance by managers. Returns are gross returns and do not reflect manager fees and expenses. A manager performance index of distressed debt investors can now be found in the *Wall Street Journal*, on a daily basis, and there are several distressed debt hedge fund indexes reflecting a sample of investment firms’ performances (see our later discussion).

2006 Performance of Defaulted Bonds

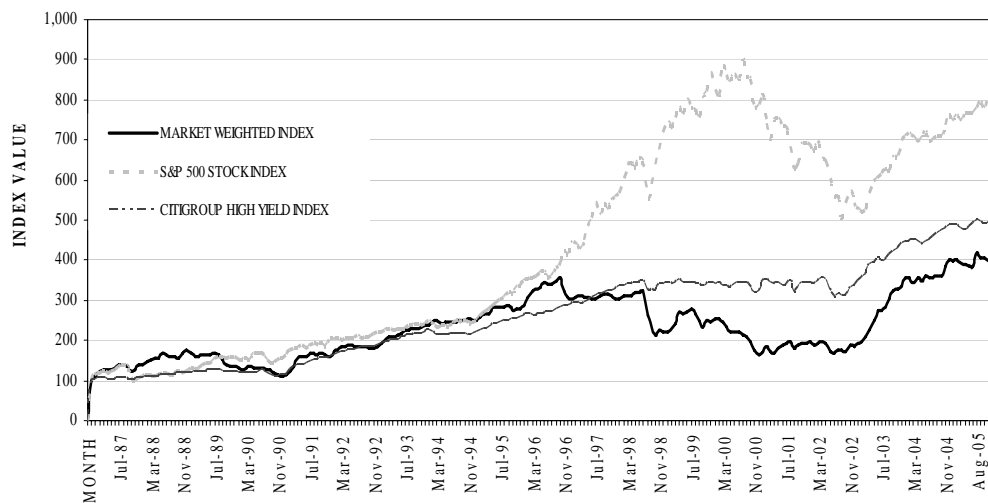
The Altman-NYU Salomon Center Index of Defaulted Bonds performed exceptionally well in 2006, increasing by 35.62%. This was the fourth highest annual return in our 20-year time series. This past year’s performance increased the arithmetic average annual return by 125 bp to 11.90%. This average annual rate is about 2.4% greater per year than that of high-yield bonds over the period 1987-2006 (although the compound averages are about the same) but still about 1.2% lower than the S&P 500 Stock Index over the same period (Figures 4, 5). The standard deviation (volatility) of defaulted bonds is almost 11% greater per year than that of common stocks (27.5% versus 16.7%) and more than double that of high-yield bonds. Measured on a monthly basis, however, the volatility of defaulted bonds (4.23% standard deviation) is about the same as that of common stocks (4.31%) but still about twice that of high-yield bonds.

Figure 4. Altman-NYU Salomon Center Defaulted Bond Index Comparison of Returns, 1987–2006

| Year | Altman-NYU Salomon Center Defaulted | | Citigroup High Yield Market Index (%) |
|---|-------------------------------------|--------------|---------------------------------------|
| | Bond Index (%) | S&P 500 (%) | |
| 1987 | 37.85 | 5.26 | 3.63 |
| 1988 | 26.49 | 16.61 | 13.47 |
| 1989 | -22.78 | 31.68 | 2.75 |
| 1990 | -17.08 | -3.12 | -7.04 |
| 1991 | 43.11 | 30.48 | 39.93 |
| 1992 | 15.39 | 7.62 | 17.8 |
| 1993 | 27.91 | 10.08 | 17.36 |
| 1994 | 6.66 | 1.32 | -1.25 |
| 1995 | 11.26 | 37.56 | 19.71 |
| 1996 | 10.21 | 22.96 | 11.29 |
| 1997 | -1.58 | 34.36 | 13.18 |
| 1998 | -26.91 | 28.58 | 3.60 |
| 1999 | 11.34 | 20.98 | 1.74 |
| 2000 | -33.09 | -9.11 | -5.68 |
| 2001 | 17.47 | -11.87 | 5.44 |
| 2002 | -5.98 | -22.08 | -1.53 |
| 2003 | 84.87 | 28.70 | 30.62 |
| 2004 | 18.93 | 10.88 | 10.79 |
| 2005 | -1.78 | 4.92 | 2.08 |
| 2006 | 35.62 | 15.80 | 11.85 |
| Arithmetic Average (Annual) Rate, 1987–2006 | 11.90 | 13.08 | 9.49 |
| Standard Deviation | 27.52 | 16.68 | 11.78 |
| Compounded Average (Annual) Rate, 1987–2006 | 8.74 | 11.84 | 8.92 |
| Arithmetic Average (Monthly) Rate, 1987–2006 | 0.79 | 1.02 | 0.74 |
| Standard Deviation | 4.23 | 4.31 | 2.03 |
| Compounded Average (Monthly) Rate, 1987–2006 | 0.70 | 0.93 | 0.72 |

Sources: NYU Salomon Center Index of Defaulted Bonds, Standard & Poor's, and Citigroup.

Figure 5. Defaulted Bond, Stock, and High Yield Bond Indices, Dec 86–Dec 06



Sources: NYU Salomon Center Index of Defaulted Bonds, Standard & Poor's, and Citigroup.

Defaulted Bank Loan Performance

The performance of defaulted securities in 2006 was marked by the wide discrepancy between defaulted bonds versus loans. Indeed, the Altman-Salomon Center Index of Defaulted Loans only increased by 4.35% and the average annual return over the period 1996-2006 dropped a bit to 6.62% per year (Figure 6). This compares unfavorably to the 11-year average annual performance of both common stocks (11.28%) and high-yield bonds (7.58%). The volatility, however, was considerably below that of common stocks and just slightly more than high-yield bonds. This was the case based on annual and monthly return data.

It is quite evident that defaulted bank loans are far less volatile than defaulted bonds, so in good years bonds will usually outperform loans and the opposite in relatively poor years. For example, in 2005, a long-only strategy in defaulted bonds actually lost money while defaulted loans did comparatively well. We estimate that the Beta (relative volatility) of defaulted bonds vis-à-vis the Combined Bond and Bank Loan Index over the period 1996-2006 was 1.38, compared to the Defaulted Bank Loan Index's Beta of 0.71.³ We will explore the correlations of each of these indexes relative to a number of other asset classes shortly.

Figure 6. Altman-NYU Salomon Center Defaulted Bank Loan Index Versus S&P 500 and Citigroup High Yield Market Index — Comparison of Returns, 1996–2006

| Year | Altman-NYU Salomon Center Defaulted Bank Loan Index (%) | S&P 500 Stock Index (%) | Citigroup High Yield Market Index (%) |
|---|--|----------------------------|---|
| 1996 | 19.56 | 22.96 | 11.29 |
| 1997 | 1.75 | 34.36 | 13.18 |
| 1998 | -10.22 | 28.58 | 3.60 |
| 1999 | 0.65 | 20.98 | 1.74 |
| 2000 | -6.59 | -9.11 | -5.68 |
| 2001 | 13.94 | -11.87 | 5.44 |
| 2002 | 3.03 | -22.08 | -1.53 |
| 2003 | 27.48 | 28.70 | 30.62 |
| 2004 | 11.70 | 10.88 | 10.79 |
| 2005 | 7.19 | 4.92 | 2.08 |
| 2006 | 4.35 | 15.80 | 11.85 |
| Arithmetic Average (Annual) Rate, 1996–2006 | 6.62 | 11.28 | 7.58 |
| Standard Deviation | 11.04 | 18.69 | 9.74 |
| Compounded Average (Annual) Rate, 1996–2006 | 6.11 | 9.74 | 7.20 |
| Arithmetic Average (Monthly) Rate, 1996–2006 | 0.55 | 0.87 | 0.60 |
| Standard Deviation | 2.58 | 4.32 | 2.17 |
| Compounded Average (Monthly) Rate, 1996–2006 | 0.51 | 0.78 | 0.58 |

Sources: NYU Salomon Center Index of Defaulted Bank Loans, Standard & Poor's, and Citigroup.

Winners and Losers in 2006

There were several spectacular positive performing bonds in 2006 as well as some almost equally spectacular negative performers. The degree of positive and negative swings was, of course, much less spectacular amongst defaulted loans. Figure 7 lists our five best and worst performing bonds and bank loans for securities that were in our indexes for the entire 12-month period in 2006. The list only shows one bond or

³ The actual equations are Bond Performance = 0.002 + 1.38 (Combined Performance) and Loan Performance = 0.001 + 0.713 (Combined Performance).

loan from each company although several firms had similar performances amongst its many securities that were included in the indexes (for example, Delta Airlines). The positive performance sectors like airlines, energy and auto-parts were well represented.

It is interesting to note, in Figure 7, that the best performing bonds and the worst performing loans came, in some cases, from the same company (for example, Delta and Delphi) and the opposite for others (for example, Enron). Calpine's bonds and loans were amongst the top performers in both categories while Collins & Aikman's were amongst the worst performers in both. These comparative bond/loan statistics should be of particular interest to those investors who utilize or are contemplating using a capital structure arbitrage strategy (that is, buying and selling two or more different securities in the same company's capital structure).

Figure 7. Top and Bottom Performing Defaulted Bonds and Loans 2006

| Top 5 Bonds | Coupon (%) | Maturity | Return (%) |
|-----------------------------|---------------------------|-------------------|-------------------|
| Foamex LP. | 13.5 | 08/15/05 | 1474.6 |
| Calpine Corp. | 4.8 | 11/15/23 | 206.8 |
| Delta Air Lines | 8.3 | 12/15/29 | 204.2 |
| Northwest Airlines | 10.5 | 04/01/09 | 203.8 |
| Delphi Corp. | 6.5 | 05/01/09 | 121.4 |
| Bottom 5 Bonds | Coupon (%) | Maturity | Return (%) |
| Collins & Aikman | 12.9 | 08/15/12 | -97.2 |
| RJ Tower Automotive | 12.0 | 06/01/13 | -84.4 |
| Enron Corp. | 7.4 | 05/15/06 | -42.8 |
| Oakwood Homes | 7.9 | 03/01/04 | -35.3 |
| Bally Total Fitness | 9.9 | 10/15/07 | -3.5 |
| Top 5 Loans | Facility | Return (%) | |
| Calpine Corp. | 2 nd Term | 39.1 | |
| W.R. Grace & Co. | Long Term Facility | 19.5 | |
| Enron Corp. | Revolver | 9.5 | |
| Federal Mogul Corp. | Term B | 6.5 | |
| JL French Automotive | 1 st Lien | 2.4 | |
| Bottom 5 Loans | Facility | Return (%) | |
| Collins & Aikman | Term Loan B | -41.4 | |
| Meridian Automotive Systems | Second Priority Tranche C | -33.3 | |
| Intermet | Term | -14.9 | |
| Delphi Corp. | Term | -4.3 | |
| Delta Air Lines | Term-Tranche A | -3.1 | |

Source: NYU Salomon Center Defaulted Bond and Bank Loan Index Databases.

Combined Bond and Bank Loan Index

Perhaps the most comprehensive index of defaulted debt involves the weighted average performance of a combined bond and bank loan index. Our market-weighted combined index performance was up by 23.40% in 2006 and now shows an average annual rate of return over the period 1996-2006 of 8.37% per year (Figure 8). The weights for this index as of year-end 2006 were 70% bonds and 30% loans, compared to almost 50/50 one year earlier. The 2006 performance easily outdistanced both common stocks (15.80%) and high-yield bonds (11.85%), although the latter two were themselves quite good. Annual volatility of our Combined Index was comparable to that of common stocks over our 11-year sample period. Both were about twice as volatile as the high-yield bond market.

Index Performance Comparison

With the increased popularity in distressed debt hedge funds, the number of benchmark performance indexes has grown. We are aware of at least eight of these distressed debt indexes measuring various aspects of distressed securities' performance. Three indexes are long-only, *gross* returns on defaulted bonds (our's) and Bankrupt Bonds (Moody's and Citigroup). The rest are indexes of *net* performance based on samples of distressed debt hedge funds. The average performance of three bankrupt (or defaulted) bond indexes in 2006 was an astounding +52.0%. The average performance (net of management and performance fees and transaction costs) of five hedge fund distressed indexes was +14.22%. Recall, that our Combined, gross, long-only Index performance was +23.40%. The hedge-fund index returns reflect investment strategies spanning the entire spectrum of passive or aggressive strategies, including arbitrage, shorting, equities, control, foreign, and the latest entry, direct lending to firms either outside or under the protection of the Bankruptcy Code.

Figure 8. Combined Altman-NYU Salomon Center Defaulted Public Bond and Bank Loan Index Comparison of Returns, 1996–2006

| Year | Altman-NYU Salomon Center Defaulted Public Bond and Bank Loan Index (%) | S&P 500 (%) | Citigroup High Yield Market Index (%) |
|---|---|--------------|---|
| 1996 | 15.62 | 22.96 | 11.29 |
| 1997 | 0.44 | 34.36 | 13.18 |
| 1998 | -17.55 | 28.58 | 3.60 |
| 1999 | 4.45 | 20.98 | 1.74 |
| 2000 | -15.84 | -9.11 | -5.68 |
| 2001 | 15.53 | -11.87 | 5.44 |
| 2002 | -0.53 | -22.08 | -1.53 |
| 2003 | 49.30 | 28.70 | 30.62 |
| 2004 | 15.40 | 10.88 | 10.79 |
| 2005 | 1.84 | 4.92 | 2.08 |
| 2006 | 23.40 | 15.80 | 11.85 |
| Arithmetic Average (Annual) Rate, 1996–2006 | 8.37 | 11.28 | 7.58 |
| Standard Deviation | 18.74 | 18.69 | 9.74 |
| Compounded Average (Annual) Rate, 1996–2006 | 6.95 | 9.74 | 7.20 |
| Arithmetic Average (Monthly) Rate, 1996–2006 | 0.61 | 0.87 | 0.61 |
| Standard Deviation | 3.07 | 4.34 | 2.18 |
| Compounded Average (Monthly) Rate, 1996–2006 | 0.56 | 0.78 | 0.59 |

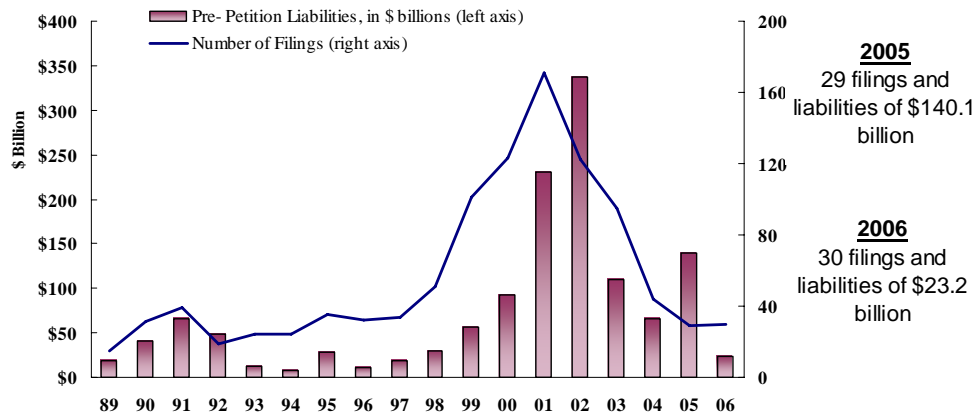
Sources: NYU-Salomon Center Defaulted Public Bond and Loan Index, Standard & Poor's, and Citigroup.

The Benign Credit Cycle

The number of new bankruptcies continued to be relatively low in the wake of the current benign credit cycle and the diminished attractiveness of Chapter 11 under the new Bankruptcy Code of 2005 (BAPCA). Figure 9 shows that the number of Chapter 11s with liabilities greater than \$100 million remained about the same in 2006, at 30 filings from last year's 29. However, the aggregate total of liabilities fell to a relatively small \$23 billion compared with about \$140 billion in 2005. In addition, the default rate on high-yield bonds fell to a 25-year low of 0.76%, with just \$7.6 billion in new bond defaults (Figure 10). No wonder there was intense competition for most of these newly defaulted issues and prices on new defaults, as well as existing ones, spiked in 2006. But, with such few new issues, distressed investors

continued to “re-invent” themselves and moved away from “traditional” distressed strategies.

Figure 9. Liabilities^a of Public Companies Filing for Chapter 11 Protection, 1989-2006



^a Minimum \$100 million in liabilities,
Source: NYU Salomon Center Bankruptcy Filings Database

Figure 10. Historical Default Rates (Straight Bonds Only Excluding Defaulted Issues From Par Value Outstanding), 1971–2006 (US Dollars in Millions)

| Year | Par Value Outstanding ^a (\$) | Par Value Defaults (\$) | Default Rates (%) | Year | Par Value Outstanding ^a (\$) | Par Value Defaults (\$) | Default Rates (%) |
|------|---|-------------------------|-------------------|------|---|-------------------------|-------------------|
| 2006 | 993,600 | 7,559 | 0.761 | 1980 | 14,935 | 224 | 1.500 |
| 2005 | 1,073,000 | 36,209 | 3.375 | 1979 | 10,356 | 20 | 0.193 |
| 2004 | 933,100 | 11,657 | 1.249 | 1978 | 8,946 | 119 | 1.330 |
| 2003 | 825,000 | 38,451 | 4.661 | 1977 | 8,157 | 381 | 4.671 |
| 2002 | 757,000 | 96,858 | 12.795 | 1976 | 7,735 | 30 | 0.388 |
| 2001 | 649,000 | 63,609 | 9.801 | 1975 | 7,471 | 204 | 2.731 |
| 2000 | 597,200 | 30,295 | 5.073 | 1974 | 10,894 | 123 | 1.129 |
| 1999 | 567,400 | 23,532 | 4.147 | 1973 | 7,824 | 49 | 0.626 |
| 1998 | 465,500 | 7,464 | 1.603 | 1972 | 6,928 | 193 | 2.786 |
| 1997 | 335,400 | 4,200 | 1.252 | 1971 | 6,602 | 82 | 1.242 |
| 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 | | | | |

| Std Dev (%) | | |
|--|-------|-------|
| Arithmetic Average Default Rate | | |
| 1971-2006 | 3.167 | 3.072 |
| 1978-2006 | 3.464 | 3.283 |
| 1985-2006 | 4.189 | 3.428 |
| Weighted Average Default Rate^b | | |
| 1971-2006 | 4.244 | |
| 1978-2006 | 4.258 | |
| 1985-2006 | 4.303 | |
| Median Annual Default Rate | | |
| 1971-2006 | 1.802 | |

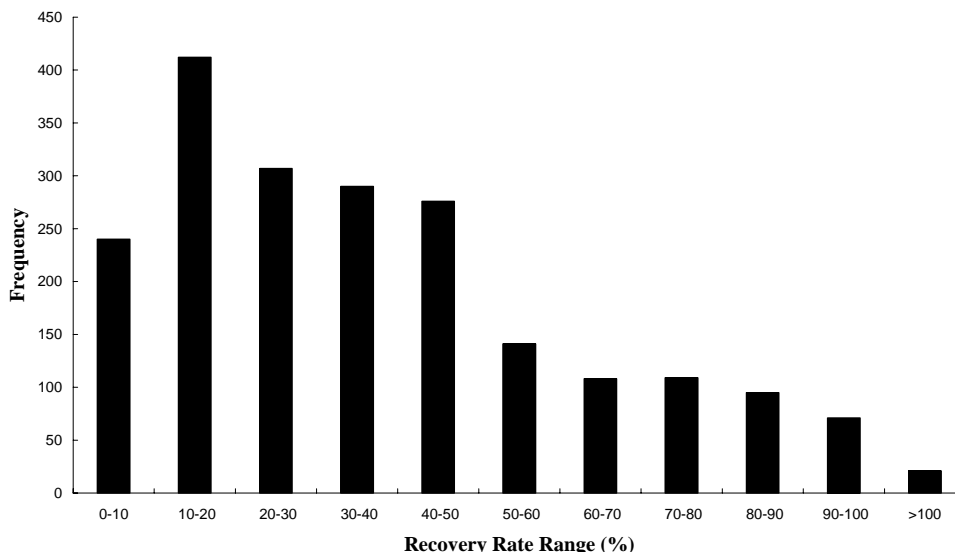
^a Weighted by par value of amount outstanding for each year.
Sources: Author's compilations.

Recovery Rates on Defaulted Debt

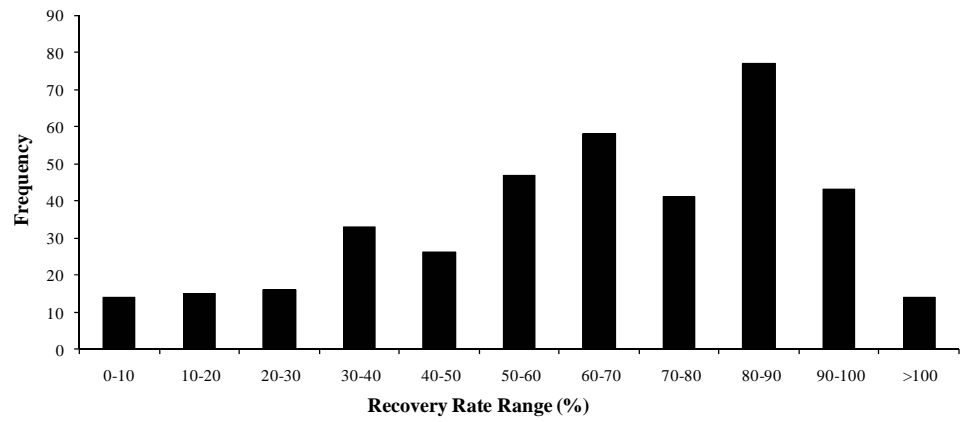
The recovery rate on defaulted bonds (price just after default) averaged an almost all-time high 65.3% in 2006 (only the Texaco - dominated rate in 1987 was higher). Again, this reflected the intense competition for new defaulted paper this past year and the massive liquidity in the system. While the historical average of recovery rates is somewhere in the 33-38% range (depending how the average is calculated), there is a considerable amount of variance. Figure 11 shows the frequency distribution of recovery rates across all seniority and industry classifications for almost 2400 bond defaults over the period 1971 – 2006. Note that the majority were below 40% and a considerable number were below even 20%. These low recoveries were almost non-existent in 2006, however. For a more complete treatment and discussion of bond recovery rates, see our companion report on defaults in the high-yield bond market (February 7, 2007).

The frequency distribution of default recovery rates was quite different for corporate loans. Based on a considerably smaller sample (384) of loan defaults over the period 1996-2006, we can observe loan recoveries based on the price one-month after default (Figure 12). The distribution of loan recoveries was much flatter than the bond default distribution, with the bulk in the 50-100% range. The most frequent decile was 80-90%. The historical average loan recovery rates were about 64.5% (arithmetic) and 56.3% (weighted) respectively, reflecting its senior and oftentimes secured priority. The standard deviation of loan recoveries was 26%.

Figure 11. Corporate Bond Default Recovery Rate Frequency (Based on number of Issues 1971 - 2006)



Number of Observations = 2383; Source: NYU Salomon Center Defaulted Bond Database.

Figure 12. Loan Default Recovery Rate Frequency (Based on number of issues 1996 - 2006)

Number of Observations = 384; Source: NYU Salomon Center Defaulted Loan Database.

Diversification: Management Styles and Return Correlations

Return Correlations

We have often noted the attractive diversification strategies with distressed debt and most other asset classes. Several domestic pension and hedge funds and foreign investors have used this strategy by allocating a portion of their total investments to distressed debt money managers. In addition, fund of funds which invest in alternative investment managers now typically consider distressed debt as an important asset class. The principal idea behind this strategy is that returns from distressed debt portfolios have relatively low correlations with returns of most other major asset classes. In addition, within the distressed space, managers have carved out distinctive styles (for example, passive, active, control or near control, long-short, arbitrage, mid-caps, etc.). We estimate that there are at least 170 investment institutions that specialize in distressed securities with combined assets under management of over \$250 billion. This is at least twice what it was just a few years ago. See Appendix A for a list of U.S distressed investors, Appendix B for those investment firms active in Europe, and Appendix C for an estimate of those firms which practice a distressed-control strategy. Also, see Appendix D for a listing and description of the various types of strategies practiced by distressed debt investors.

Figure 13 shows the correlations between monthly returns on the Altman-NYU Salomon Center Defaulted Bond Index and two other risky asset classes, as well as 10-year Treasury Bonds, for the 20-year period 1987-2006. Over this period, the correlation of defaulted bond returns with the S&P 500 was just 28.70%, with Citigroup's High Yield Bonds (60.74%) and a negative -11.51% with ten-year Treasury Bonds. These are fairly similar to last year's correlations.

While the correlation between defaulted debt and the S&P 500 index is quite low, the correlation with the equity performance of companies that have emerged from Chapter 11 is quite high. Indeed, a new Index from Jefferies & Co. of emerged company (or post-reorg.) equities, with monthly data going back to 2002, had a 0.587 correlation with our Defaulted Bond Index, a 0.441 correlation with our Defaulted Loan Index and a 0.584 correlation with our Combined Index. Since both distressed debt and emerging equities are attractive to the same investor class, these high correlations are not surprising. The correlation between defaulted and high-yield bonds is also fairly high (+0.61).

Figure 13. Correlation of Altman-NYU Salomon Center Indexes of Defaulted Bonds With Other Securities Indexes, 1987–2006

| | Altman Defaulted Bond Index (%) | S&P 500 (%) | Citigroup High-Yield Market Index (%) | Ten-Year Tsy Bond (%) |
|-----------------------------------|---------------------------------|-------------|---------------------------------------|-----------------------|
| Altman Defaulted Bond Index | 100.00 | 28.70 | 60.74 | -11.51 |
| S&P 500 | | 100.00 | 50.39 | 3.63 |
| Citigroup High Yield Market Index | | | 100.00 | 5.92 |
| Ten-Year Treasury Bond | | | | 100.00 |

Source: NYU Salomon Center, Credit and Debt Markets Program.

As was the case in the past, the correlation of high-yield bonds and the Defaulted Bank Loan Index (+42.92%) is weaker than with Defaulted Bonds (+62.71% ; see

Figure 14). Returns on Defaulted Bank Loans and both the S&P 500 and 10-year Treasuries remained negative through 2006.

Finally, the monthly return correlation between our two defaulted debt indexes remained relatively low at +58.16%, perhaps surprising to some. We showed earlier that even for companies with extreme high or low returns, the correlation is oftentimes negative between the bonds and loans of defaulted companies. Case studies of the specific reasons for this negative correlation are beyond the scope of this report, but it is important to understand how these occurrences materialize.

Figure 14. Correlation of Altman-NYU Salomon Center Indexes of Defaulted Loans With Other Securities Indexes, 1987–2006

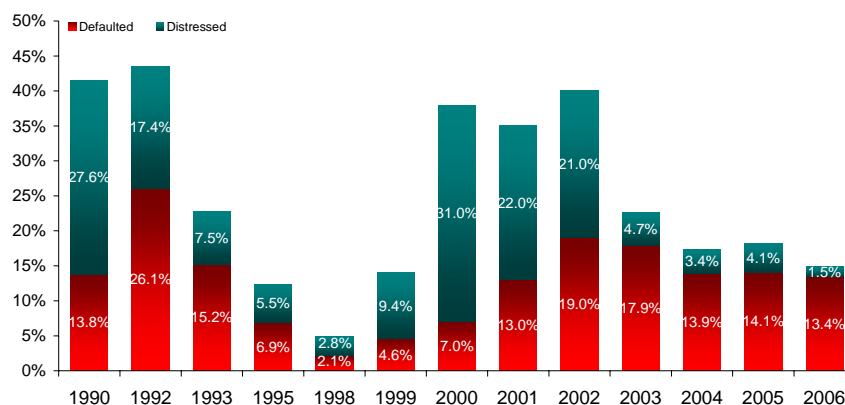
| | Altman Loan Index (%) | S&P 500 (%) | Citigroup High Yield Market Index (%) | Ten-Year Tsy Bond (%) | Altman Bond Index |
|-----------------------------------|--------------------------|----------------|--|--------------------------|----------------------|
| Altman Defaulted Loan Index | 100.00 | -0.14 | 42.92 | -8.11 | 58.16 |
| S&P 500 | | 100.00 | 49.92 | -10.87 | 24.28 |
| Citigroup High Yield Market Index | | | 100.00 | -8.46 | 62.71 |
| Ten-Year Treasury Bond | | | | 100.00 | -12.05 |
| Altman Defaulted Bond Index | | | | | 100.00 |

Source: NYU Salomon Center, Credit and Debt Markets Program.

Proportion and Size of the Distressed and Defaulted Public and Private Debt Markets

The distressed and defaulted debt proportion of the high-yield and defaulted debt markets in the United States comprised about 14.9 % of the total of these two markets as of December 31, 2006, considerably below last year's level of 18.2%, and the lowest total since 1999 (see Figure 15). The distressed segment (bonds selling at 10% above the risk-free rate) dropped to its lowest level in history, to 1.5%, from when we first started following this proportion in 1990. The defaulted segment also decreased to 13.4% from last year's 14.1%.

Figure 15. Distressed^a and Defaulted Debt As a Percentage of Total High Yield Plus Defaulted Debt Market^b, 1990–2006^c



a Defined as yield-to-maturity spread greater than or equal to 1000 bp over comparable Treasuries.

b \$1218.4 billion as of December 31, 2006.

c Some years not available as no survey results available.

Source: NYU Salomon Center.

No doubt the unusual massive liquidity provided by non traditional (for example, hedge funds and CBOs), as well as traditional, high-yield bond market participants lowered the required yield, especially on the more highly distressed firms' securities. Indeed, it is estimated that hedge funds now own more than 25% of the high-yield market's supply as they look to supplement their more traditional defaulted debt purchases. And, new issues rated CCC to CCC- were at an all time high (\$20.1 billion) in 2006.

The defaulted bond amount total is derived by adding new defaults in 2006 (\$7.6 billion), subtracting those bonds from companies emerging from Chapter 11 on other restructurings (\$14.9 billion) and adding those bonds in default at the start of the year (\$163.5 billion). The net amount of defaulted bonds outstanding is therefore \$156.2 billion as of December 31, 2006 - about \$7 billion less than last year.

Figure 16. Estimated Face and Market Values of Defaulted and Distressed Debt, 2004–2006 (Dollars in Billions)

| | Face Value (\$) | | | Market Value (\$) | | | Market/Face Ratio |
|---------------------------------|-----------------|--------------|--------------------|-------------------|--------------|--------------------|-------------------|
| | 31 Dec 04 | 31 Dec 05 | 31 Dec 06 | 31 Dec 04 | 31 Dec 05 | 30 Dec 06 | |
| Public Debt | | | | | | | |
| Defaulted | 152.0 | 163.5 | 156.2 ^a | 76.0 | 89.9 | 101.5 | 0.65 ^d |
| Distressed | 36.6 | 49.3 | 17.9 ^b | 23.8 | 34.5 | 13.4 | 0.75 ^d |
| Total Public | 188.6 | 212.8 | 174.1 | 99.8 | 124.5 | 115.0 | |
| Private Debt | | | | | | | |
| Defaulted | 334.4 | 359.8 | 406.1 ^c | 234.1 | 287.8 | 365.5 ^c | 0.90 ^d |
| Distressed | 80.6 | 108.5 | 46.6 ^c | 68.5 | 97.6 | 44.3 ^c | 0.95 ^d |
| Total Private | 415.0 | 468.2 | 452.7 | 302.6 | 385.4 | 409.7 | |
| Total Public and Private | 603.6 | 681.1 | 626.8 | 402.4 | 509.9 | 524.7 | |

^a Calculated using: (2005 defaulted population) + (2006 defaults) - (2006 Emergences). ^b Based on 1.7% of size of high yield market (\$1,053.9 billion). ^c Based on a private/public ratio of 2.6. ^d The market/face value ratio was 0.65 for public defaulted debt, 0.75 for public distressed debt, 0.90 for private defaulted debt and 0.95 for private distressed debt in 2006. Source: Estimated by Professor Edward Altman, NYU Stern School of Business, from NYU Salomon Center Defaulted Bond and Bank Loan databases.

Figure 16 shows our estimates of the amounts of public and private, defaulted and distressed debt outstanding. As discussed above, the public defaulted bonds totaled \$156.2 billion and public distressed were down considerably to \$17.9 billion from \$49.3 billion one year earlier. The distressed amount is just 1.7% of the total high-yield market. This proportion is very low historically and down from an already low 4.75% last year.

In our most recent reports, we had been using a private/public debt ratio of 2.2 to determine the private defaulted and distressed debt amounts. Periodically, we review this ratio and update this estimate by analyzing a recent large sample of bankrupt and defaulted firms' balance sheets. In this case, we examined a total of 106 corporate bankruptcies or firms that defaulted but did not go bankrupt over the period 2004 - 06. Two-thirds of these firms had both public and private debt, while the balance only had private debt. The resulting private/public debt ratio was 2.6, about 0.4 greater than our previous estimates.

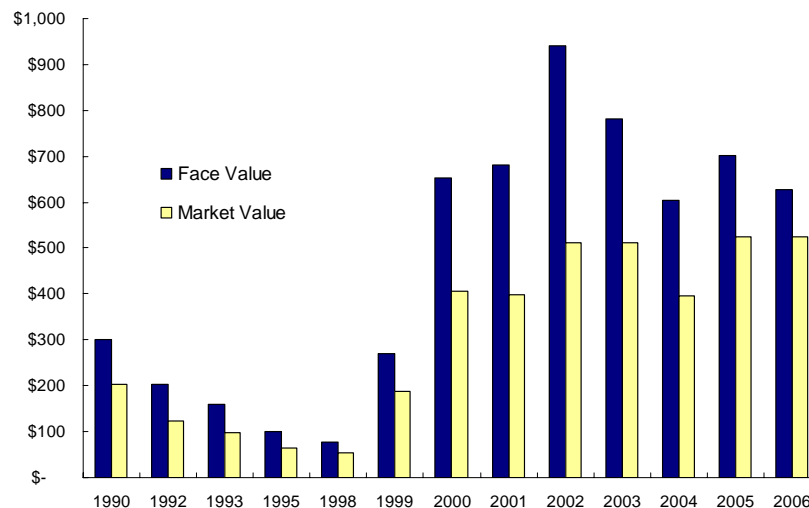
Applying the new private/public debt ratio to our public defaulted and distressed totals yielded our private debt estimates. So, as of December 31, 2006, we show in Figure 16 our estimate of a total defaulted and distressed population of \$626.8 billion, down by \$54.3 billion from last year but above 2004's total face value. All of these recent totals are considerably below the 2002 estimate (the historic high).

The market value estimates are based on our slightly revised-upward "haircuts" from face values. For example, we now use a 65% ratio for public defaulted bonds and a 75% for public distressed bonds. We also use our index as a guide for the 90% ratio for private defaulted loans. Applying these ratios, we conclude that the combined public and private, defaulted and distressed debt market value amounts were \$524.7 billion as of December 31, 2006, an increase of about \$15 billion from the prior year.

Figure 17 shows the latest totals for the combined defaulted and distressed face and market values, as well as a time series of most, but not all, of the years since 1990. It is of interest to note that the estimated market value today is actually somewhat higher than it was in 2002 when the face value was 30% greater than today due to higher pricing and higher "haircuts". This is due to the incredible demand for and the resulting positive performance of distressed and defaulted debt over this four-year

period. During this period, the average market/face value ratio of defaulted bonds increased from 17% to 75% and defaulted loans from 46% to about 90%.

Figure 17. Size of the Defaulted and Distressed Debt Market, 1990–2006 (Dollars in Billions)



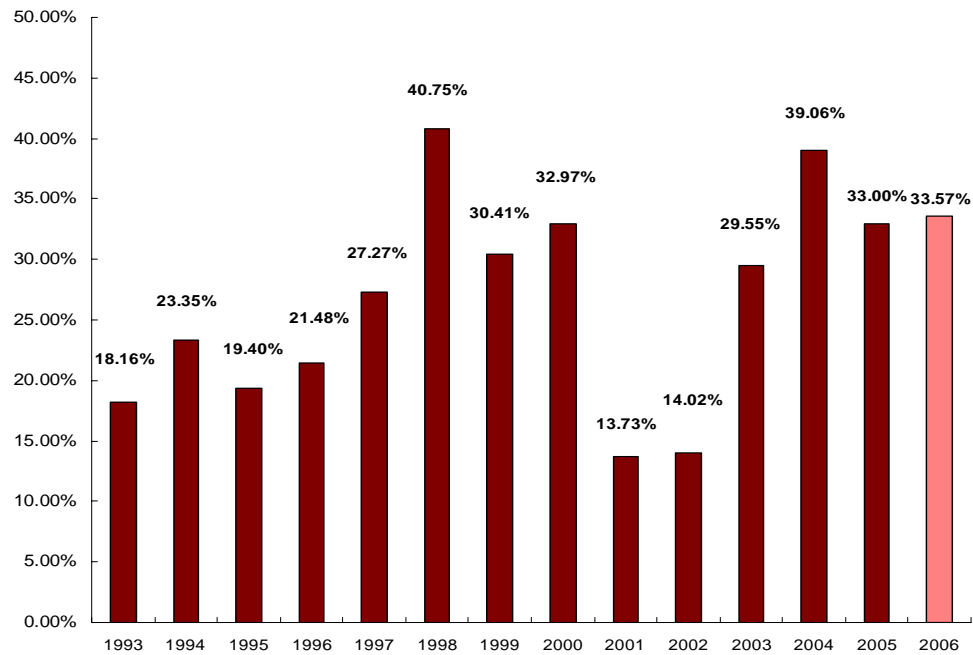
Source: Authors' compilations.

We expect the market size of distressed and defaulted bonds to increase in the next two years as both the distressed ratio (now at its all time low) and default rate (see next section) increase.

Forecasting Default Rates and Size of the Distressed and Defaulted Debt Market

We have discussed in our past reports and in a working paper (for example, E. Altman, “Are Historically Based Default and Recovery Models Still Relevant in Today’s Credit Environment”, *NYU Salomon Center Report*, November 2006) why we believe today’s default rates are so low and recoveries above average. Using our mortality rate estimates and the past new issuance rating amounts, we expect defaults to increase in both 2007 and 2008 and the default rate to reach 2.5% in 2007 and 3.7% in 2008. While still below the historic average, these rates imply about \$27.5 billion of defaults in 2007 and \$44.4 billion in 2008.

Implicit in the mortality rate forecast (see Altman, 1989) is the rating distribution of new issues. Figure 18 shows the proportion of new issue amounts rated B- or below (including non-rated issues). Note that this proportion has been relatively high in recent years. Indeed, the CCC rating proportion exceeded 14% (over \$20 billion) in 2006.

Figure 18. Percentage of New High-Yield Issues Rated B- or Below Based on Amount of Issuance

Source: From Standard & Poor's statistics.

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Appendix A

US Distressed Debt Managers — 2006

| | | |
|-----------------------------------|---------------------------------|--------------------------------------|
| Abrams Capital | Golden Tree LLC | Perry Partners |
| AEG | Gracie Capital | Peter Schoenfeld Asset Management |
| Angelo, Gordon & Company | Gradient Partners L.P. | Pine Creek |
| Apex Fundamental Partners LLC | Gramercy Capital | Pinewood Capital Partners LLC |
| Apollo Management | Greenwich Capital | Plainfield Asset Management |
| Appaloosa Management | Greywolf Capital | PMI |
| Ares Corporate Opportunities Fund | Gruss Asset Management L.P. | PPM America |
| Ashmore Asian Recovery | GSC Capital | Proprietary Trading of Market Makers |
| Aurelius Capital Management | H.I.G. | Quadrangle Group LLC |
| Avenue Capital Group | Halcyon/Slika (Alan B.) Mgmt. | Questor Management |
| Basso Asset Management | Harbert Capital | Radius Equity Partners |
| Bay Harbour Advisors | Harvest Capital | Redwood Capital |
| Bayside Capital | Helios Advisors | Republic |
| Beltway Capital | Highbridge Capital Management | Resolution Partners |
| Bennett Management Company | Highland Capital | Restoration Capital Management |
| Black Diamond | Industria Partners | Resurgence Corporate Fund |
| Blackport Capital Fund, Ltd | Ivory Investment Management | Rebeco/Weiss Peck & Greer |
| Boone Capital Management | JLL Partners | Salisbury |
| Brigade Capital | JMB Capital | Sandell Asset Management |
| The Broe Companies | K Capital Partners | Satellite Asset Management |
| Buckeye Capital Partners | KD Distressed Capital | Sato Capital |
| Canyon Capital | Kilimanjaro Advisors | Schultze Asset Management |
| Camulous Capital | King Street Advisors | Scoggin Capital |
| Cardinal Capital | KPS Special Situations Fund | Scott's Cove Capital Mgmt. LLC |
| Carl Marks | KS Distressed Debt | Seneca Capital Inv't. Partnership |
| Carlyle Strategic Partners | Lampe Conway | Signature Capital Partners |
| Cargill Value Investment | Langley Management | Silvergang |
| Catlock Capital | Laurel Ridge Asset Management | Silverpoint Capital |
| Centerbridge Capital | Leucadia National Corporations | Spring Street |
| Cerebrus Partners | Levco Debt Opportunities | Stanfield Capital Management |
| Chrysalis Capital Partners | Litespeed Partners | Stairway Capital Advisors |
| Citadel Investments | Loeb Partners | Stark Investments |
| Cohanzick Management | Lonestar Partners LP | Strategic Value Partners |
| Commonwealth | LongAcre Capital Partners | Summit |
| Concordia Advisors | Longroad Asset Management | Stonehill Capital |
| Contrarian Capital Management | Marathon Capital LLC | Sun Capital Partners, Inc. |
| Corsair | Mariner Investment Group | Sunrise Capital Partners |
| Cypress Management | Mason Capital Management | TA Mckay & Co. |
| D.B. Zwirn Partners | MatlinPatterson Global Advisors | Taconic Capital Partners |
| D.E. Shaw | Mellon HBV Capital Mgmt. | The Baupost Group |
| Davidson/Kempner (MH Davidson) | MHR | Third Avenue Value Fund |
| DDJ Capital Management | Millennium | TPG Credit Management |
| Deephaven Capital Management | MJ Whitman Mgmt Co. | Triage Capital |
| Delaware Street Capital | Monomoy Capital | Trilogy Capital |
| Elliott Advisors | Moore Asian Recovery Fund | Trust Company of the West |
| Endurance Capital | MSD Capital | Turnberry Capital |
| Deltec Recovery Fund | Murray Capital | Tyndall Partners |
| Durham Asset Management | MW Post | Van Kampe |
| Eagle Rock Capital | New Generation Advisers | Varde Partners, Inc. |
| EOS Partners | Oakhill | W.L. Ross & Co. |
| Epic Asset Management | Oaktree Capital | Wayland Fund |
| Fairfield Greenwich | Och Ziff Friedheim | Wellspring Capital Partners |
| Farallon Partners | Owl Creek Capital | Wexford Capital |
| Forest Investment Management | Pacholder Associates, Inc. | William E. Simon & Sons |
| Franklin Mutual Recovery | Pacific Alternative Asset Mgmt. | Woodside Management |
| Fortress Capital Corp. | Pardus Capital | Whippoowill Associates, Inc. |
| GE Finance | Patriarch | Xerion Partners |
| Glenview Capital Management | Pegasus Investors | York Capital |
| Golden Capital | Pequot Capital | |

Source: Authors' compilations.

Appendix B

US Distressed Funds with European Offices — 2006

| | | |
|----------------------|----------------------------------|-----------------------------------|
| Avenue Capital Group | Fortress Capital Corp | Oaktree Capital |
| Camulos Capital | HBK Investments LP | Och Ziff Capital Management |
| Cargill Investors | Highbridge Capital Management | Peter Schoenfeld Asset Management |
| Cerebrus Partners | Lonestar Partners LP | Silverpoint Capital |
| Citadel Investments | Marathon Capital LLC | Strategic Value Partners |
| Davidson Kempner | Matlin Patterson Global Advisors | Texas Pacific Credit |
| Elliott Advisors | Millennium Capital | TPG Credit Management |
| EOS Partners | | |

Source: Authors' compilations.

European Distressed Debt Managers — 2006

| | | |
|--------------------------|--------------------------|--------------------------|
| Argo Capital | Cyrus Capital | Sisu Capital |
| Bluebay Asset Management | Glencore Finance | Thames River LLP |
| Centaurus Capital | Orn Capital | Tisbury Capital |
| Cheyne Capital | Picus Capital Management | Trafalgar Asset Managers |
| Cognis Capital | RAB Capital | |

Source: Authors' compilations.

Appendix C

Distressed Active/Control Investors — 2006

| | | |
|-------------------------------|---------------------------------|-------------------------------|
| Angelo, Gordon & Co. | Elliott Associates, L.P. | P. Schoenfeld Asset Mgt. LLC |
| Apollo management | Farallon Capital | Perry Capital |
| Appaloosa Management LP | Harbinger Capital Partners | Plainfield Asset Mgt |
| Aurelius Capital Management | Industria Partners | Ramius Capital Group LLC |
| Avenue Capital Partners | Longroad Asset Management | Sandell Asset Management Corp |
| Carlyle Strategic Partners | KPS Special Situations Fund | Silver Point Capital L.P. |
| Centerbridge Capital Partners | MatlinPatterson Global Advisors | Stark Investments |
| Cerberus partners | Mellon HBV | Sun Capital Partners |
| Citadel Limited Partnership | Monomoy Capital Partners | Tudor Investment Corp et al |
| D.B. Zwirn Partners | Oakhill | W.L. Ross & Co |
| D.E. Shaw | Oaktee Capital | Whippoorwill Associates |

Source: Authors' compilations.

Appendix D

Investment Styles and Target Returns in Distressed Debt Investing

| <u>Active/Control</u> | <u>Active/Non-Control</u> | <u>Passive</u> |
|--|--|--|
| Requires 1/3 minimum to block and ½ to control; may require partner(s) | Senior secured, senior unsecured | Invest in undervalued securities trading at distressed levels |
| Take Control of company through debt/equity swap | Active participation in restructuring process; Influence process | Sub-strategies: trading/buy-hold/senior or senior secured/sub debt/"busted converts"/capital structure arbitrage/long-short, value |
| Restructure or even purchase related businesses; roll-up | Exit via debt or equity (post-chapter 11) markets | Trading oriented; Sometimes get restricted |
| Equity infusion; run Company | Generally do not control | Holding period of 6 months to 1 year generally; Longer sometimes |
| Exit 2-3 years | Holding period of 1-2 years | Target return: 12-20% |
| Large or Mid-Small Cap focus | Large or Mid-Small Cap focus | |
| Target return: 20-25% | Target return: 15-20% | |

Source: NYU Salomon Center and Common Fund.