

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

Special Report on

**The Investment Performance and Market Dynamics of
Defaulted Bonds and Bank Loans:
2011 Review and 2012 Outlook**

By

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February 09, 2012

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Acknowledgments

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Brenda Kuehne is a Credit and Debt Markets Research Specialist at the NYU Salomon Center. We appreciate the assistance of Alex Dai and Vin Morada of the NYU Salomon Center and the several market makers who provided us with price quotations. We offer a special thanks to the various rating agencies, Oleg Melentyev of Bank of America Merrill Lynch, Daniel Sweeney of Credit Suisse, Steven Miller of S&P LCD, Kerry Mastroianni of New Generation Research and Ty Wallach and Sheru Chowdhry of Paulson & Co.

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Despite gains early in the year, defaulted debt securities ended 2011 with negative annual returns that were well below the historical average. The loss on the Combined Altman-Kuehne Index was -3.02%. This long-only, U.S. and Canadian debt index was equally influenced by weak performances from both defaulted bonds and loans. The Combined Index return was below that of both Citigroup's High-Yield Bond Index (+5.52%) and the S&P 500 Stock Index (+2.11%).

The Altman-Kuehne Defaulted Bond Index performed considerably worse than last year when the return was +25.76%, and also significantly below the historical average (+11.59%). This long-only defaulted bond index lost 3.66% in 2011, the eighth poorest annual performance since we began monitoring this market in 1987. Defaulted bank loans were equally affected by market forces, with the Altman-Kuehne Defaulted Loan Index posting an annual loss of -2.31%, once again lower than 2010's annual return of 9.98%.

The market-to-face-value ratio of the defaulted *bond* index rose slightly in 2011 to 34%, a three percentage point increase from 2010's year-end level (31%). However, the average ratio over the year was 31%; most of the gain in value occurred in the last quarter of the year as several issuers entered the index with issues pricing at levels higher than many of those existing in the index previously. The market-to-face value of defaulted *bank loans* remained essentially unchanged at 52%, the year-end level in 2010 as well.

As expected in a year of abundant liquidity, with record-setting high-yield bond issuance, the dollar-denominated default rate on high-yield bonds remained well-below the arithmetic and weighted historical averages (3.23% and 4.00%, respectively), and increased only slightly from 1.13% in 2010 to 1.31% in 2011. According to S&P's LCD compilations, default rates on leveraged loans decreased from the prior year, with an issuer-based default rate of 0.62%, and 0.77% based on amount of issuance (from 2.86% and 1.87%, respectively).

The low new total of defaults combined with greater amounts of emergencies from Chapter 11 reduced the face and market values of defaulted bonds and loans at year-end 2011. These reductions, however, were more than offset by the substantial increase in distressed bonds and loans, resulting in a very large increase in the size of the defaulted and distressed, public and private, debt market. This market's face value increased to \$1.46 trillion, a 38% growth from \$1.1 trillion one year earlier. The market value's increase was as impressive, gaining 40% from \$597 billion at the end of 2010 to \$836 billion one year later.

As for distressed debt, hedge-fund indexes fared only slightly better in 2011 than our long-only, 100% invested defaulted debt indexes reported above. These indexes reflect actual performance averages of samples of hedge funds. The average performance in 2011 of these four indexes was a negative 2.73%. These indexes are based on returns after manager fees while our price performance indexes are not.

Measuring and Monitoring Performance of Defaulted Bonds

Defaulted Bond Index

The Altman-Kuehne 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 goes back to 1987, and a later time series on defaulted loans was originated in 1996. As of December 31, 2011, the number of issues in our defaulted bond index was 57, up slightly from the 53 at year-end 2010, and about one-quarter the number of its previous highs in the early 1990s and 2001 (Figure 1). The face value of the defaulted bonds that comprised this index decreased from its level in 2010 by 32%, to \$18.0 billion, and the market value decreased by an estimated 26% to \$6.1 billion.

There were 19 firms included in the defaulted bond index at year-end 2011, which was more than in 2010, but still below the long-term average. It should be noted that the number and amount of defaulted bond issues is considerably greater than those listed in Figure 1 since our index totals are limited to any one issuer comprising no more than 10% of the index's total market value, and we only include issues for which we find consistent monthly quotes.

Although applied to a smaller population, thereby resulting in a lower market value than in 2010, due to the higher prices of newly defaulted bonds in the final quarter of 2011, the market-to-face value ratio rose slightly to 34%, a three (absolute) percentage point increase over the prior year.

¹ This index, originally developed in "Investing in Distressed Securities," E. Altman, The Foothill Group, 1990, is maintained and published on a monthly basis by the NYU Salomon Center of the Leonard N. Stern School of Business. It is available by subscription from the Salomon 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.

Figure 1. Size of the Altman-Kuehne Defaulted Bond Index, 1987–2011

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
2007	48	17	13.8	6.3	0.46
2008	77	28	29.6	4.5	0.15
2009	91	34	45.5	15.1	0.33
2010	53	16	26.4	8.3	0.31
2011	57	19	18.0	6.1	0.34

Source: NYU Salomon Center.

Defaulted Bank Loan Index

Bank loans — another major market in defaulted debt instruments — had a similar performance experience to that of bonds in 2011, with an increase in the number of issues, but decreases in face values and market values. As can be seen in Figure 2, the face value of the loan facilities that comprised the index in 2011 dropped by 19% to \$9.1 billion, with a similar decrease in market values, from \$5.9 billion to \$4.7 billion. The market-to-face value ratio remained essentially unchanged from the year-end 2010 of 52%. Both the face and market values of this Index dropped to a level lower than anything seen since year-end 1999.

Figure 2. Size of the Altman-Kuehne Defaulted Bank Loan Index, 1995–2011 (Dollars in Billions)

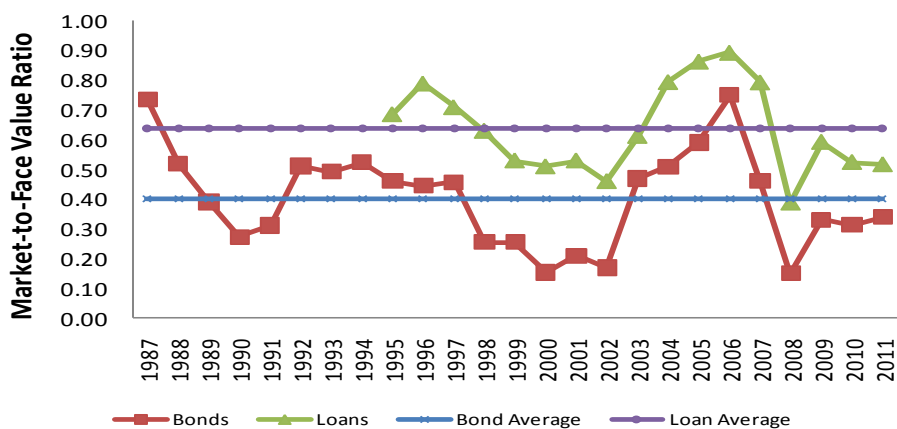
Year-End	Number of Facilities	Number of Firms	Face Value (\$ Billions)	Market Value (\$ Billions)	Market/Face Ratio
1995	17	14	2.9	2.0	0.69
1996	23	22	4.2	3.3	0.79
1997	18	15	3.4	2.4	0.71
1998	15	13	3.0	1.9	0.63
1999	45	23	12.9	6.8	0.53
2000	100	39	26.9	13.6	0.51
2001	141	56	44.7	23.8	0.53
2002	64	51	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
2007	31	13	13.0	10.4	0.79
2008	71	31	27.5	10.7	0.39
2009	67	27	57.6	34.1	0.59
2010	20	12	11.3	5.9	0.52
2011	28	15	9.1	4.7	0.52

Source: NYU Salomon Center

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. In 2011, the bond index’s ratio rose slightly while the loan index’s ratio dropped marginally from the prior year. As of year-end 2011, the market-to-face value ratio for defaulted bonds was 34%, six percentage points lower than the historical average of 40%. The market-to-face value ratio for defaulted loans was 12 percentage points lower than the historical average (64%) at 52%. This is the fourth year in a row that the Index levels have been below historical averages. The last time we saw such a string of below average levels was 1998-2002.

Figure 3. Altman-Kuehne Default Debt Indexes – Market-to-Face Value Ratios, Annual 1987–2011



Note: The loans median market-to-face value is 0.61 and average market-to-face value is 0.64. Bonds median market-to-face value is 0.42 and the average market-to-face value is 0.40.

Sources: Figures 1 and 2, NYU Salomon Center.

Performance Measurement

Our indexes include the securities of firms in different stages of reorganization — either bankruptcy or restructuring. We calculate the returns for the index using data compiled 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. The return history shows 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 (see, for example, Altman and Eberhart (1994)³).

Our indexes do not include convertible or non-US and non-Canadian company issues, nor do they include distressed but not defaulted securities or distressed exchange securities. The performance measure is based on a fully invested, long-only strategy. Returns are calculated from individual bond and bank loan price movements; they are not based on average performance by managers. Returns are gross returns and do not reflect manager fees and expenses. There are, however, several distressed debt hedge fund indexes that reflect a sample of investment firms’ performances (discussed later in this report).

2011 Defaulted Bond Performance

The Altman-Kuehne Index of Defaulted Bonds performed poorly in 2011, decreasing by 3.66%. This past year’s performance reduced the average arithmetic annual rate of return on our index by 64bp to 11.59% (Figure 4). This is still 186bp greater than the average annual performance of US high-yield bonds over the same period (1987–2011) and 64bp more than the S&P 500 (dividends reinvested). However, the compound average annual rate of return is considerably lower, reflecting its time series negative performance in ten of the 25 years in our sample period. The entire time series of returns in these three indexes is shown in Figure 5. Using the time series’ compound annual return as a basis of comparison, the stock market slightly outperformed high-yield bonds, which outperformed defaulted bonds, over the last 25 years.

The volatility of the defaulted bond index is considerably greater than either high-yield bonds or common stocks when measured on an annual basis, but only slightly greater than common stocks, when measured on a monthly basis. No doubt, the “calming” influence of coupon payments on high-yield bonds is a major reason why that index’s volatility measure (both annual and monthly) is considerably below those of defaulted bonds and common stocks. Indeed, defaulted bonds are “no-yield” bonds since they trade “flat.” Still, as we will show at a later point, this high relative volatility of defaulted bonds is somewhat mitigated by its low correlation with most other asset classes.

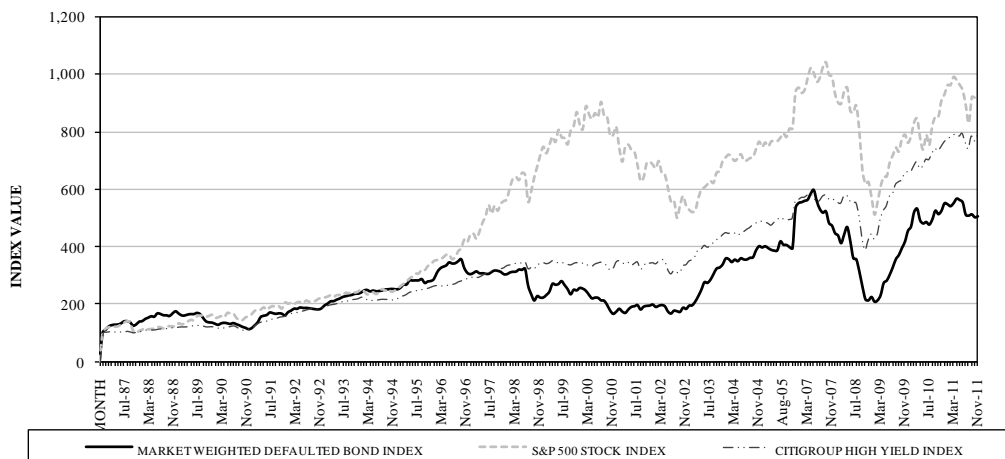
³ Generally, the higher the seniority, the better the performance. See E. Altman and A. Eberhart (1994), “Do Security Provisions Protect Bondholders’ Investments?”, *Journal of Portfolio Management*, Summer.

From a return/risk standpoint, the average annual return to annual standard deviation ratio favored the high-yield bond market and the stock market. Using arithmetic average returns, the ratios are 0.61 for High-Yield Bonds, 0.60 for the S&P 500 and 0.35 for Defaulted Bonds. On a monthly return basis, the Defaulted Bond Index performs relatively better, as does the High-Yield Bond Index (which performs best).

Figure 4. Altman-Kuehne Defaulted Bond Index Comparison of Returns, 1987-2011

Year	Altman-Kuehne Defaulted Bond Index		Citigroup High Yield Market 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
2007	-11.53	5.50	1.84
2008	-55.09	-37.00	-25.91
2009	96.42	26.46	55.19
2010	25.76	15.06	14.32
2011	-3.66	2.11	5.52
Arithmetic Average (Annual) Rate, 1987-2011	11.59	10.95	9.73
Standard Deviation	33.54	18.31	15.88
Compounded Average (Annual) Rate, 1987-2011	6.70	9.31	8.66
Return/Standard Deviation Ratio	0.35	0.60	0.61
Arithmetic Average (Monthly) Rate, 1987-2011	0.66	0.85	0.72
Standard Deviation	4.80	4.56	2.57
Compounded Average (Monthly) Rate, 1987-2011	0.54	0.74	0.69
Return/Standard Deviation Ratio	0.14	0.19	0.28

Sources: NYU Salomon Center, Standard & Poor's, and Citi.

Figure 5. Defaulted Bond, Stock, and High Yield Bond Indexes, Dec 86–Dec 11

Source: NYU Salomon Center.

Defaulted Bank Loan Performance

The Defaulted Bank Loan Index also performed weakly, with an annual loss in 2011 of 2.31%, almost six percentage points lower than its historical average of 4.53% (Figure 6). This average annual return dropped by 45bp from 4.98% in 2010. The historical average annual return over the 16-year time series compares poorly to the S&P 500 Index (8.52%) and high-yield bonds (8.40%). Again, our compound average annual returns are lower than the arithmetic averages by a wide margin.

The volatility of the Defaulted Bank Loan Index compares favorably with common stocks based on both annual and monthly returns (about a 2.9% lower standard deviation based on annual returns compared to common stocks). The volatility of defaulted loans in comparison to high-yield bonds was similar, with only a 2bp difference between the two. Some of our defaulted loans continue to pay interest each month, even in the post-Chapter 11 petition period. In general, price changes are less volatile than those of lower-priority bonds. Again, like with Defaulted Bonds, the average returns to standard deviation ratios favor common stocks and High-Yield Bonds over Defaulted Loans, with High-Yield Bonds the clear winner based on both annual average and monthly average measures.

Figure 6. Altman-NYU Salomon Center Defaulted Bank Loan Index Versus S&P 500 and Citigroup High-Yield Market Index – Comparison of Returns, 1996–2011

Year	Altman-Kuehne 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
2007	2.27	5.50	1.84
2008	-43.11	-37.00	-25.91
2009	32.80	26.46	55.19
2010	9.98	15.06	14.32
2011	-2.31	2.11	5.52
Arithmetic Average (Annual) Rate, 1996–2011	4.53	8.52	8.40
Standard Deviation	17.16	20.10	17.14
Compounded Average (Annual) Rate, 1996–2011	2.96	6.52	7.18
Return/Standard Deviation Ratio	0.26	0.42	0.49
Arithmetic Average (Monthly) Rate, 1996–2011	0.30	0.64	0.62
Standard Deviation	3.22	4.71	2.90
Compounded Average (Monthly) Rate, 1996–2011	0.24	0.53	0.58
Return/Standard Deviation Ratio	0.09	0.14	0.21

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

Winners and Losers in 2011

Positive defaulted bond and loan performance in 2011 appears to have been moderate, with very little difference in return amongst the top three performing bonds, and top two performing loans (Figure 7). The two *best* performing bonds had returns of 20-23%, while the two *best* performing loans had returns of 39-41%. Contrarily, the negative performers showed slightly more variety in returns with the *worst* bonds losing anywhere from 26-67% of value and the *worst* loans losing 16-83%.

To be fair, Figure 7 lists only bonds and loans that were in our indexes for the entire year, had an outstanding face value of \$100 million or greater, and a year-end 2010 price of 10% of par or higher. Each individual category shows only one bond or loan from a company, although several firms had similar performances amongst its many securities.

Ambac Financial Group appears on both the “best and “worst” performers’ lists for bonds in 2011. Lehman Brothers appeared on the best performers list for bonds for the second year in a row, while TOUSA appeared on the worst performers list for the same. Of interest is the fact that the Fontainebleau Las Vegas term loan was the worst performing loan in 2010, and subsequently became the best performing loan in 2011.

Figure 7. Top- and Bottom-Performing Defaulted Bonds and Loans, 2011

Top Three Bonds			
	Coupon (%)	Maturity	Return (%)
Ambac Financial Group, Inc.	9.5	2/15/2021	23.1
Vitro SAB de CV	9.1	2/01/2017	20.5
Lehman Brothers Holdings, Inc.	4.5	7/26/2010	19.0
Bottom Three Bonds			
	Coupon (%)	Maturity	Return (%)
TOUSA, Inc.	9.0	7/01/2010	-67.5
Ambac Financial Group, Inc.	9.47	8/01/2011	-30.9
Tribune Co.	7.3	3/01/2013	-25.9
Top Three Loans			
	Facility	Return (%)	
Fontainebleau Las Vegas	Term T1	40.5	
White Birch Paper Co.	Term B	38.9 ^a	
W.R. Grace & Co.	Revolver	2.2	
Bottom Three Loans			
	Facility	Return (%)	
Graceway Pharmaceuticals	Term, 2 nd Lien	-83.3	
Local Insight Regatta Hldgs, Inc.	Term B	-68.0	
Penton Media, Inc.	Term B	-16.5	

^aYear-end price below 10% of par, but included in order to have three loans meeting remaining criteria.

Source: NYU Salomon Center.

Combined Bond and Bank Loan Index

Our market-weighted combined defaulted debt index was down by 3.02% in 2011, and now shows an average annual arithmetic rate of return of 7.13% for 1996–2011, down about 51bp from last year's annual average return (Figure 8). The average annual return during this 16-year period was still below that of high-yield bonds (8.40%) and the return on common stocks (8.52%). The 2011 performance was below that of both high-yield bonds (+5.52%) and common stocks (+2.11%).

The weights for the combined index as of year-end 2011 were almost the same as the prior year, with weightings of 43% for loans versus 57% for bonds, compared to 42% loans and 58% bonds in 2010. The annual volatility of the combined index of defaulted bonds and loans was slightly higher than common stocks, but almost eight percentage points higher than that of high-yield bonds. Based on monthly returns, however, our combined index had lower volatility than common stocks.

Figure 8. Combined Altman-NYU Salomon Center Defaulted Public Bond and Bank Loan Index Comparison of Returns, 1996-2011

Year	Altman-Kuehne Defaulted Public Bond and Bank Loan Index (%)	S&P 500 Market Index (%)	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
2007	-3.30	5.58	1.84
2008	-47.52	-37.00	-25.91
2009	55.99	26.46	55.19
2010	17.70	15.06	14.32
2011	-3.02	2.11	5.52
Arithmetic Average (Annual) Rate, 1996-2011	7.13	8.52	8.40
Standard Deviation	24.74	20.10	17.14
Compounded Average (Annual) Rate, 1996-2011	4.22	6.52	7.18
Arithmetic Average (Monthly) Rate, 1996-2011	0.40	0.64	0.62
Standard Deviation	3.74	4.71	2.90
Compounded Average (Monthly) Rate, 1996-2010	0.33	0.53	0.58

Sources: NYU-Salomon Center, Standard & Poor's, and Citi.

Performance Comparison With Other Distressed Debt Indexes

We compare our index returns with at least five other “distressed” debt indexes. Four of these (D.J./Credit Suisse, Hennessey, HFR, and Van Hedge) are indexes based on average manager performance. Three of the four manager-based indexes slightly outperformed both our combined and defaulted bond indexes in 2011, with the average performance in the very narrow range between -2.42% (HFR) and -1.9% (Van Hedge) (see Figure 9). The Dow Jones/Credit Suisse distressed index realized a lower annual return than our indexes in 2011, with a year-end loss of 4.24%. Keep in mind that the manager-based indexes incorporate all strategies of distressed hedge funds, including short sales, high-yield bonds (especially those selling at discounts), equities of Chapter 11 emerging firms, international securities, and more. The returns to the funds are after transaction costs and fees to the manager. The average performance in 2011 of these four hedge-fund-manager indexes was a negative 2.73%.

Figure 9. Hedge Fund Distressed Debt Index Returns, 2003-2011

Calendar Year	Dow Jones/ Credit Suisse	Hennessee	HFR	Van Hedge	Altman-Kuehne Combined
2003	25.12%	26.79%	29.58%	27.42%	49.30%
2004	15.60%	18.98%	18.89%	18.19%	15.14%
2005	11.75%	9.71%	8.25%	9.34%	1.73%
2006	15.58%	15.78%	15.95%	15.33%	23.38%
2007	8.28%	8.31%	5.07%	7.37%	-3.30%
2008	-20.48%	-29.28%	-25.21%	-21.05%	-47.52%
2009	20.95%	42.97%	28.54%	24.69%	55.99%
2010	10.26%	15.47%	12.12%	16.35%	17.70%
2011	-4.24	-2.36	-2.42	-1.9	-3.02

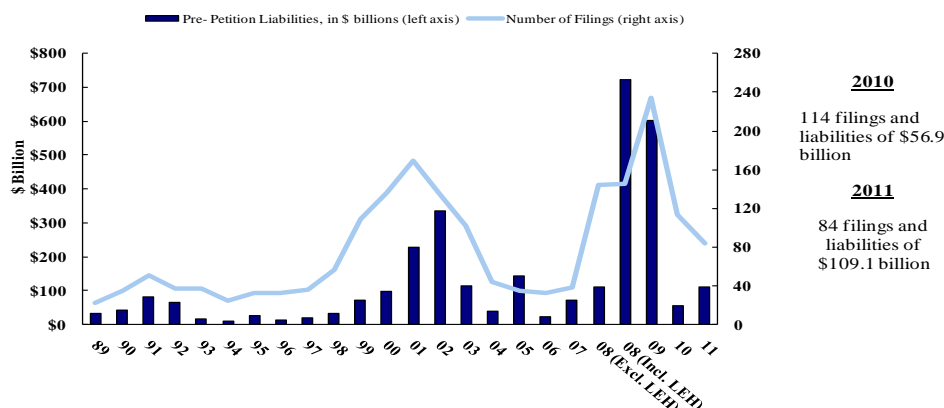
Source: Bloomberg and NYU Salomon Center.

The fifth index with which we may compare returns is the Credit Suisse's defaulted bond index, a breakout of the high-yield index. For the year 2011, this index posted returns of positive 0.03%. Recall, the Altman-Kuehne Defaulted Bond Index was down 3.66%. Credit Suisse's defaulted loan index, a breakout of the leveraged loan index, posted losses of 2.89% (our Loan index was down by 2.31%). All indexes discussed had modest losses or a tiny gain in 2011.

Bankruptcies and Defaults

Eighty-four companies with liabilities of more than \$100 million filed for Chapter 11 in 2011, approximately 26% less than the number of companies that filed in 2010 (Figure 10). The amount of liabilities increased substantially to about \$109 billion from \$56 billion in 2010. The number of mega-bankruptcies with liabilities greater than \$1 billion decreased fifty percent to seven from 14 last year, and remained below the historical average of 11.

The default rate on high-yield bonds registered 1.31% in 2011, increasing slightly from 1.13% in 2010, with \$17.8 billion in new bond defaults (Figure 11). This was the second lowest annual rate since 2007.

Figure 10. Liabilities^a of Public Companies Filing for Chapter 11 Protection, 1989-2011

^a Minimum \$100 million in liabilities.

Source: NYU Salomon Center Bankruptcy Database.

Figure 11. Historical Default Rates (Straight Bonds Only Excluding Defaulted Issues From Par Value Outstanding), 1971-2011 (US Dollars in Millions)

Year	Par Value Outstanding ^a (\$)	Par Value Defaults (\$)	Default Rates (%)	Year	Par Value Outstanding ^a (\$)	Par Value Defaults (\$)	Default Rates (%)
2011	1,354,649	17,813	1.315	1984	40,939	344	0.840
2010	1,221,569	13,809	1.130	1983	27,492	301	1.095
2009	1,152,952	124,130	10.744	1982	18,109	577	3.186
2008	1,091,000	50,763	4.653	1981	17,115	27	0.158
2007	1,075,400	5,473	0.509	1980	14,935	224	1.500
2006	993,600	7,559	0.761	1979	10,356	20	0.193
2005	1,073,000	36,209	3.375	1978	8,946	119	1.330
2004	933,100	11,657	1.249	1977	8,157	381	4.671
2003	825,000	38,451	4.661	1976	7,735	30	0.388
2002	757,000	96,858	12.795	1975	7,471	204	2.731
2001	649,000	63,609	9.801	1974	10,894	123	1.129
2000	597,200	30,295	5.073	1973	7,824	49	0.626
1999	567,400	23,532	4.147	1972	6,928	193	2.786
1998	465,500	7,464	1.603	1971	6,602	82	1.242
1997	335,400	4,200	1.252				
1994	235,000	3,418	1.454				Std Dev (%)
1993	206,907	2,287	1.105				
1992	163,000	5,545	3.402	Arithmetic Average Default Rate			
1991	183,600	18,862	10.273	1971-2011		3.229	3.177
1990	181,000	18,354	10.140	1978-2011		3.494	3.369
1989	189,258	8,110	4.285	1985-2011		4.093	3.510
1988	148,187	3,944	2.662	Weighted Average Default Rate^b			
1987	129,557	7,486	5.778	1971-2011		3.994	
1986	90,243	3,156	3.497	1978-2011		4.001	
1985	58,088	992	1.708	1985-2011		4.027	
				Median Annual Default Rate			
				1971-2011		1.708	

^a As of midyear. ^b Weighted by par value outstanding for each year.

Sources: Authors' compilations, NYU Salomon Center Database.

Recovery Rates on Defaulted Debt

The weighted-average recovery rate (based on market prices just after defaults) on high-yield bond defaults in 2011 rose from 44.6% in 2010 to 60.3% by the end of the year. This is well above the historic average (1978-2011) of 45.3%, and the highest recovery rate since 2007.

The recovery rate in 2011 was not as affected by distressed exchange (DE) defaults as it was in 2010. DE recoveries are generally higher than typical defaults. Without DE defaults, the 2011 recovery rate was 57.9%, only 234bp lower than the recovery rate including all defaults. This latter rate is more relevant to our defaulted debt indexes because distressed exchange bonds do not enter our indexes.

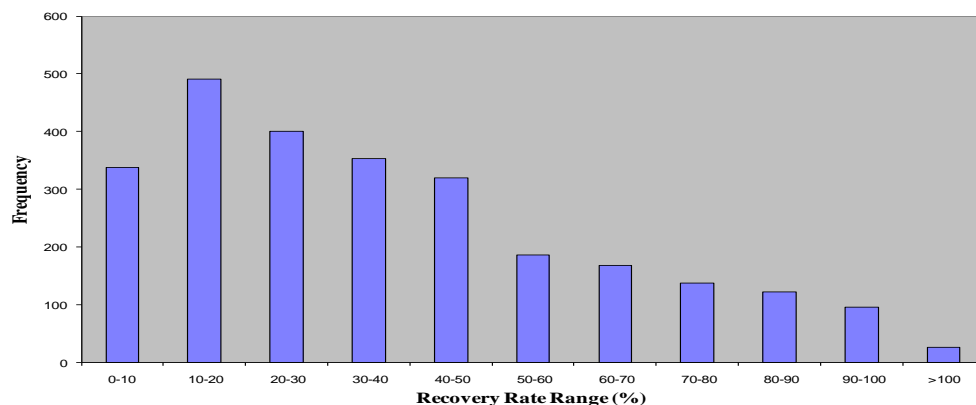
Figure 12 shows the frequency distribution of recovery rates across all seniority and industry classifications for more than 2,600 bond defaults during 1971–2011. Note that the modal value is actually only 10–20%, even though our historical average recovery rate range is 35–40%. The vast majority falls in the 0–50% range. For a more complete treatment and discussion of bond recovery rates, see our companion report on defaults in the high-yield bond market.⁴

The weighted-average recovery rate on defaulted loans was only 51.7% in 2011, compared to the historical average of 63.7%. The frequency distribution of default recovery rates was quite different for corporate loans (Figure 13) than we saw earlier for defaulted bonds (Figure 12). Based on a smaller but still relevant sample of 659 loan defaults during 1996–2011, we can observe loan recoveries based on the price one month after default. The distribution of loan recoveries in 2011 was skewed more toward the higher end of the default distribution, with the bulk in the 50-100% range, the opposite as is the case with bonds. The most frequent decile was 80-90%. The higher average recovery rate on defaulted loans compared to bonds reflects its senior, and often secured, status. The shorter measurement period is also more favorable. The standard deviation of loan recoveries was about 34%, higher than the same for bonds (25%). Relative to the means, however, the standard deviation divided by mean recoveries for loans was 0.53, compared to 0.63 for bonds, indicative of the higher variability of bond default recoveries⁵.

⁴ E. Altman and B. Kuehne, "NYU Salomon Center Special Report on Defaults and Returns in the High-Yield and Distressed Debt Market: The Year 2011 in Review and Outlook", *NYU Salomon Center*, February 2012; also published under: E. Altman and B. Kuehne, "Defaults and Returns in the High-Yield and Distressed Debt Market: The Year 2011 in Review and Outlook", *Paulson & Co. Inc.*, February 3, 2012

⁵ This statistic is known as the coefficient of variation and is a relevant comparative statistic for populations with different mean values.

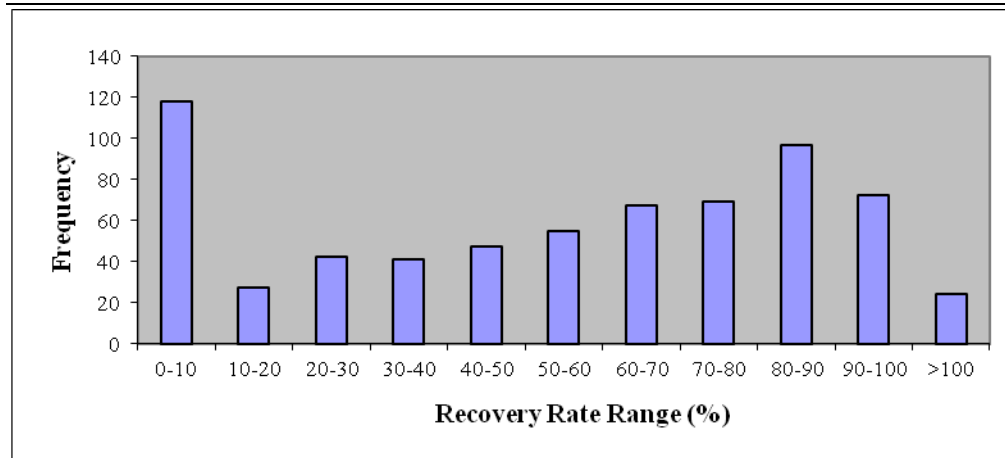
Figure 12. Corporate Bond Default Recovery Rate Frequency (Based on Number of Issues 1971–2011)^a



^a Number of Observations = 2,637.

Source: NYU Salomon Center Default Database.

Figure 13. Loan Default Recovery Rate Frequency (Based on Number of Issues 1996–2011)^a



^a Number of Observations = 659. Source: NYU Salomon Center.

Defaulted Debt Performance Versus Default Rates

We have sometimes commented upon the relatively very high returns on defaulted bonds and loans in the year(s) following a surge in defaults in one or more prior years. The best example of this is the huge outperformance on defaulted bonds (84.9%) and loans (27.5%) in 2003, following the record default rate year of 2002 (12.8%). Something similar occurred in 1991, when defaulted bonds returned 43.1%, although the high default rate year of 1990 was followed by an equally high rate in 1991, mostly in the early months of that year.

In 2009, however, we observed an out-performance on defaulted bonds and bank loans which coincided with a huge year in defaults. Actually, 2009 had two distinct periods. In the first several months, defaults surged and returns were poor. In the second two-thirds of the year, defaults dropped dramatically (especially in the second

half, excluding November) and returns surged. So, in effect, a strong recovery in the market did follow a peak in defaults, only both occurred in the same calendar year. The same phenomenon occurred in 1991.

We can examine the relationship between default rates and either concurrent or subsequent returns on defaulted bonds, bank loans, and our combined index in Figure 14. We ran univariate regressions where the independent variable is the default rate and the dependent variable is either the defaulted bond, loan, or combined index performance. It appears that the strongest relationship between default rates and subsequent returns is when the default rate is from one to two years prior to the performance year. There was very little, and certainly non-significant, relationship found over the period 1987-2011 between default rates and returns measured on a concurrent basis.

Figure 14. Regression (Correlation) Analysis of Defaulted Debt Index Returns Versus Default Rates (1997-2011)

Panel A. Defaulted Debt (t+1) Versus Default Rate (t)
Defaulted Bonds (t+1) = $-0.13 + 5.60$ (Default Rate (t)) Correlation (y/x) = 54.7% R2 = 30.0% t-test = 2.36 (.05 level)
Defaulted Loans (t+1) = $-0.06 + 2.33$ (Default Rate (t)) Correlation (y/x) = 53.3% R2 = 28.4% t-test = 2.27 (.05 level)
Combined Index (t+1) = $-0.09 + 3.65$ (Default Rate (t)) Correlation (y/x) = 56.3% R2 = 31.7% t-test = 2.45 (.05 level)
Panel B. Defaulted Debt (t+2) Versus Default Rate (t)
Defaulted Bonds (t+2) = $0.01 + 2.19$ (Default Rate (t)) Correlation (y/x) = 21.0% R2 = 4.4% t-test = 0.75 (not significant)
Defaulted Loans (t+2) = $-0.03 + 1.42$ (Default Rate (t)) Correlation (y/x) = 31.8% R2 = 10.1% t-test = 1.16 (not significant)
Combined Index (t+2) = $-0.00 + 1.66$ (Default Rate (t)) Correlation (y/x) = 25.0% R2 = 6.2% t-test = 0.89 (not significant)
Panel C. Defaulted Debt (t) Versus Default Rate (t)
Defaulted Bonds (t) = $0.01 + 2.36$ (Default Rate (t)) Correlation (y/x) = 23.5% R2 = 5.5% t-test = 0.90 (.not significant)
Defaulted Loans (t) = $0.01 + 0.86$ (Default Rate (t)) Correlation (y/x) = 19.5% R2 = 3.8% t-test = 0.74 (.not significant)
Combined Index (t) = $0.02 + 1.30$ (Default Rate (t)) Correlation (y/x) = 20.4% R2 = 4.2% t-test = 0.78 (.not significant)

Source: NYU Salomon Center.

We find that the correlation between the default rate on high-yield bonds and the following year's Combined Index of Defaulted Bonds and Bank Loans was quite high, at over 56% (Panel A, bottom). Indeed, the default rate explained almost 32% of the variance in the combined index's next year's performance. Similar results can be seen with the default rate and the bond and the bank loan performance association. While our time series is only 15 years, the t-statistic (2.45), which measures whether the independent variable (default rate) is statistically meaningful, was significant at the 5% level of confidence.

It is important to note that the coincident relationship between default rates and defaulted debt returns shows little association ($R^2 = 4.2\%$) for the combined index, 3.8% for the defaulted bank loans, and 5.5% for the defaulted bonds; see panel C in Figure 14). As noted above, however, our regressions did not pick up the possibility of an intra-year correlation between defaults and subsequent returns on defaulted bonds and bank loans.

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, hedge fund, 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 an important asset class. The principal idea behind this strategy is that returns from distressed debt portfolios have a relatively low correlation with returns from most other asset classes. This notion is being challenged, however, in recent years (see below).

In addition, managers have carved out distinctive styles within the distressed space (for example, passive, active, control or near control, long-short, arbitrage, and mid-caps, to name a few). We estimate that there are over 200 investment institutions in the United States that specialize in distressed securities.

Figure 15 shows the correlations between monthly returns on the Altman-Kuehne Defaulted Bond Index and two other risky asset classes, as well as 10-Yr Treasury Bonds for the 25-year period of 1987–2011. During this period, the correlation of defaulted bond returns with the S&P 500 was 41.31%, 66.99% with Citigroup's High Yield Bond Index, and -26.68%, with 10-Yr Treasury Bonds.

Figure 15. Correlation of Altman-Kuehne Monthly Indexes of Defaulted Bonds With Other Securities Indexes, 1987–2011

	Altman-Kuehne Defaulted Bond Index (%)	S&P 500 (%)	Citi High-Yield Bond Index (%)	Tsy 10-Yr Bond (%)
Altman-Kuehne Defaulted Bond Index	100.00	41.31	66.99	-26.68
S&P 500		100.00	58.73	-6.41
Citi High-Yield Bond Index			100.00	-5.60
Ten-Year Treasury Bond				100.00

Sources: NYU Salomon Center, S&P and Citi.

As was the case previously, the correlation of high-yield bonds and the Defaulted Bank Loan Index (57.43%) is weaker than with defaulted bonds (69.39%, Figure 16). Note the shorter measurement period for the loan index correlations. The correlation of returns on defaulted bank loans and 10-Yr Treasuries remained negative through 2011 at -26.82% and showed only slight correlation (34.22%) with the S&P 500 Index, the latter of which was up slightly, however, from last year's 32.85% correlation. As will be discussed shortly, returns for all asset classes in the period 2008-2011 appeared to be more highly correlated than in any other distressed credit and subsequent recovery cycle we have ever observed.

Finally, the monthly return correlation between our two defaulted debt indexes remained virtually unchanged at 65.69% from 65.87% one year earlier. This follows from the fact that both indexes experienced similar degrees of loss in 2011.

Figure 16. Correlation of Altman-Kuehne Indexes of Defaulted Loans With Other Securities Indexes, 1996-2011 (In Percent)

	Altman-Kuehne Bond Index (%)	Altman-Kuehne Loan Index	Altman-Kuehne Combined Index	S&P 500 (%)	Citi High-Yield Bond Index (%)	10-Yr Tsy Bond (%)
Altman-Kuehne Defaulted Bond Index	100.00	65.69	92.49	43.41	69.39	-35.58
Altman-Kuehne Defaulted Loan Index		100.00	88.34	34.22	57.43	-26.82
Altman-Kuehne Combined Index			100.00	43.14	69.56	-35.27
S&P 500				100.00	61.91	-22.48
Citi High-Yield Bond Index					100.00	-18.57
Ten-Year Treasury Bond						100.00

Sources: NYU Salomon Center, S&P, and Citi.

A Continuing Investment Dilemma

Normally, in a credit environment of extremely low default risk, both in terms of recent statistics and near-term future estimates, yield spreads should be below average and the outlook for risky debt markets fairly bullish. The yield spread at the end of 2011, however, is above average at 654bp (vs. 525bp average), reflecting great uncertainty about the future. These risks include concerns about the sluggish growth in the U.S. economy, European sovereign and banking default risk, interest rate increases, the refinancing needs of the federal and municipal government sectors in the U.S., and the deteriorating credit quality of new-issue bond and loan financings, especially high-yield and leveraged loans.

Our concerns about the near-term outlook on high-yield bond returns, written about in several of our recent quarterly reports, were justified in a sense, with the lackluster absolute performance of non-investment grade bonds in 2011 (although a total return of about 5% compared to most asset classes, except Treasuries, was quite decent last year). The higher yields now available across the board actually may provide some attractive alternatives going forward.

The stock market still looks undervalued, with P/E ratios relatively low, excellent growth in many corporate profits, albeit mainly from cost-cutting, and interest rates still at extremely low levels. With all of the above in mind, one could be fairly bullish about the stock market's prospects, yet bearish, or at least not very optimistic about risky bond markets, especially high-yield. Considering investment choices between various capital markets, it is instructive to observe historical correlations with particular scrutiny of the most recent past.

Figure 17 shows the correlation between the S&P 500 stock index monthly returns vs. both high-yield and defaulted debt indexes. The latter are based on our Altman-Kuehne/NYU-Salomon Center Defaulted Bond and the Combined Defaulted Bond and Bank Loan Indexes. The periods covered are the last three stressed credit cycles: 1990/1991, 2001/2002, and the most recent 2008/2009 (through March). We also observe the correlations for the recovery period since April 2009, and other past recoveries (not shown here), as well as the entire sample period 1987-2011. The results are quite revealing.

Typically during stressed credit cycles (and also the subsequent recovery), correlations between the stock market and risky debt markets are quite low - - 12% in 1990/1991, 23% in 2001/2002, and, not shown, -16% and 43% in their subsequent recoveries. Over the entire sample period since we have been tracking defaulted debt as an asset class (1987-present), the correlation between the S&P 500 and defaulted bond returns is only 41%, and a moderate 59% for the high-yield market and stock market returns. However, in the most recent economic and financial collapse of 2008-early 2009, the latter's correlation spiked enormously to 73%. In the most recent cycle (January 2010 - December 2011), the correlation between defaulted bonds and bank loans and the S&P 500 Stock Index was 60% and 80% between the S&P 500 and Citi's High-Yield Bond Index! On any given day, it is likely that if there is bad news about financial or default related uncertainties, both risky bond and stock markets decline, with a flight to quality, and the opposite is true if the news is positive.

Our dilemma, much as it has been for the past year, is that if we are to be concerned about risky debt in the near future, how can we be bullish about the stock market? A more positive spin on the correlation pattern is that the optimistic stock market outlook will dominate bond market uncertainties and both will prosper in the near-term future. Of course, bond market prospects might brighten in the short term, with a credible European containment plan, an observation we have been making for some time now. Additionally, yield spreads in the high-yield bond market are quite attractive relative to historical levels.

Figure 17. Total Monthly Return Correlations on Various Asset Class Indexes During Stressed and Recovery Credit Cycles

		Citi HY Index	S&P 500 Stock Index
Stressed Cycle I ^a 01/1990 – 12/1991 (24 obs.)	Defaulted Bond Index	68%	12%
	S&P 500 Stock Index	48%	
Stressed Cycle II ^b 01/2001 – 12/2002 (24 obs.)	Defaulted Bond Index	76%	23%
	S&P 500 Stock Index	54%	
Stressed Cycle III 01/2008 – 03/2009 (15 obs.)	Defaulted Bond Index	80%	73%
	S&P 500 Stock Index	73%	
Recovery Cycle 04/2009 – 04/2011 (25 obs.)	Defaulted Bond Index	71%	65%
	S&P 500 Stock Index	67%	
Full Sample Period 01/1987 – 12/2011 (300 obs.)	Defaulted Bond Index	65%	41%
	S&P 500 Stock Index	59%	
Most Recent Cycle 01/2010 – 12/2011 (24 obs.)	Defaulted Bond Index	67%	60%
	S&P 500 Stock Index	80%	

^a Correlation between Defaulted Bond Index and S&P 500 during recovery cycle was -16%.

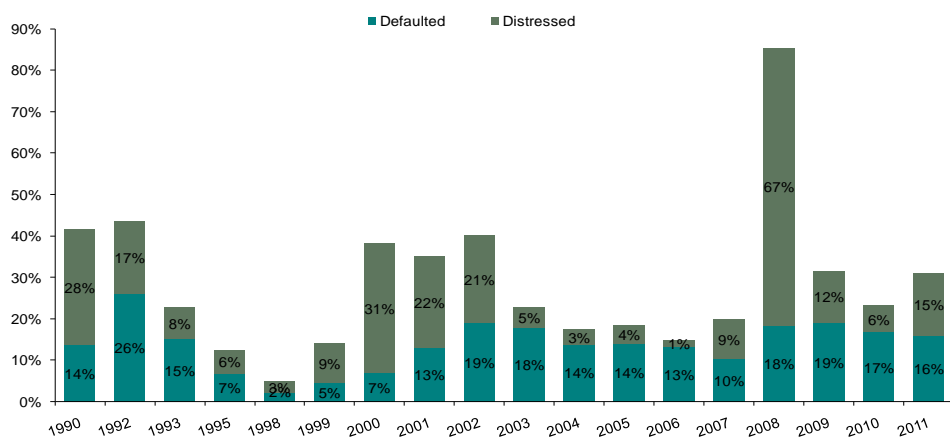
^b Correlation between Defaulted Bond and Bank Loan Index and S&P 500 during recovery cycle was 43%, and the Defaulted Bond Index and the S&P was 49%.

Source: E. Altman, NYU Salomon Center.

Proportion and Size of the Distressed and Defaulted Public and Private Debt Markets⁶

The distressed and defaulted debt proportion of the high-yield plus defaulted debt markets in the United States was roughly 31.0 % as of December 31, 2011, up considerably from 23.1% one year earlier (Figure 18). A steady decrease had occurred in this metric from December 31, 2008 through the first-quarter 2011 due to a drop in the distress ratio of issues trading at least 1,000bp over comparable duration US Treasury bonds. However, this ratio rose from 4.2% at the end of the first-quarter 2011, to 18.9% during the third quarter, to finally settle at 15.02% by year-end. This 15.0% level is based on the combined high-yield and defaulted bond population. The distress ratio for just the high-yield market was 17.9%, a decrease from September 30, 2011 when it was 22.3%, its highest level since September 2009.⁷ This level is based on number of issues, with comparable levels based on issuers and dollar amount⁸.

Figure 18. Distressed^a and Defaulted Debt, as a Percentage of Total High Yield Plus Defaulted Debt Market,^b 1990–2011^c



^a Defined as yield-to-maturity spread greater than or equal to 1,000bp over comparable Treasuries. ^b \$1.575 trillion as of December 31, 2011. ^c Some years not available as no survey results are available.

Source: NYU Salomon Center, Merrill Lynch (Bank of America).

⁶ The material in this section can also be found in our companion report (footnote 4) and can be skipped if you have already read that material.

⁷ A study by J. Gonzalez-Heres, P. Chen and S. Shin, “Revisiting the Altman Definition of Distressed Debt and a New Mechanism for Measuring the Liquidity Premium of the High Yield Market”, *Journal of Fixed Income*, Fall 2010, shows that about 50% of all distress rated firms default within about four years. The paper also discusses and analyzes the importance of market liquidity in explaining the volatility in the distressed ratio.

⁸ Source: Bank of America Merrill Lynch. The distress ratio used prior to 3Q 2011 had included all USD-denominated debt, without regard to where issuance took place. From that report forward, the ratio calculation only includes USD-denominated debt issued by companies domiciled in the U.S. See also our later discussion on the distress ratio.

The defaulted bond amount total is derived by adding the new defaults of 2011 (\$17.81 billion) to the existing defaulted bonds as of year-end 2010, subtracting those bonds of firms whose reorganization plans were deemed effective and have emerged from Chapter 11 (\$19.9 billion) and, finally, by deducting the value of bonds which defaulted as part of a completed distressed exchange (DE) during the year (\$1.7 billion). The latter, while part of our defaulted total, do not trade after the exchange, or trade as non-defaulted debt. In 2011, the defaulted bond proportion decreased slightly to 16.0% as the amount of emergencies exceeded that of new, non-DE defaults.

Figure 19 shows our estimate of the size of the defaulted and distressed debt markets for both public and privately issued debt. At \$251.5 billion as of year-end 2011, the face value amount of public defaulted bonds was \$3.8 billion less than at year-end 2010 (\$255.3).

The distressed amount of the total high-yield bond market increased substantially in 2011 to \$236.6 billion, up from \$97.3 billion one year earlier. As previously discussed, this is attributable to the increase in the distress ratio.

Figure 19. Estimated Face and Market Values of Defaulted and Distressed Debt, 2009–2011 (Dollars in Billions)

	Face Value (\$)			Market Value (\$)			Market/ Face Ratio ^d
	31 Dec 09	31 Dec 10	31 Dec 10	31 Dec 09	31 Dec 10	31 Dec 10	
Public Debt							
Defaulted	279.61	255.27	251.48 ^a	97.87	102.11	88.02	0.35
Distressed	180.99	97.32	236.61 ^b	135.74	68.12	165.63	0.70
Total Public	460.60	352.59	488.10	233.61	170.23	253.65	
Private Debt							
Defaulted	699.04	510.54	502.97 ^c	419.42	280.79	251.48	0.50
Distressed	452.48	194.64	473.22 ^c	361.98	145.98	331.26	0.70
Total Private	1,151.51	705.17	976.19	781.40	426.77	582.74	
Total Public and Private	1,612.12	1,057.76	1,464.29	1,015.01	597.00	836.39	

^a Calculated using: (2010 defaulted population) + (2011 defaults) - (2011 Emergences) - (2011 Distressed Restructurings). ^b Based on 17.88% of the size of the high-yield market (\$1.323 trillion). ^c Based on a private/public ratio of 2.0. ^d The market/face value ratio was 0.40 for public defaulted debt, 0.70 for public distressed debt, 0.55 for private defaulted debt and 0.75 for private distressed debt in 2010.

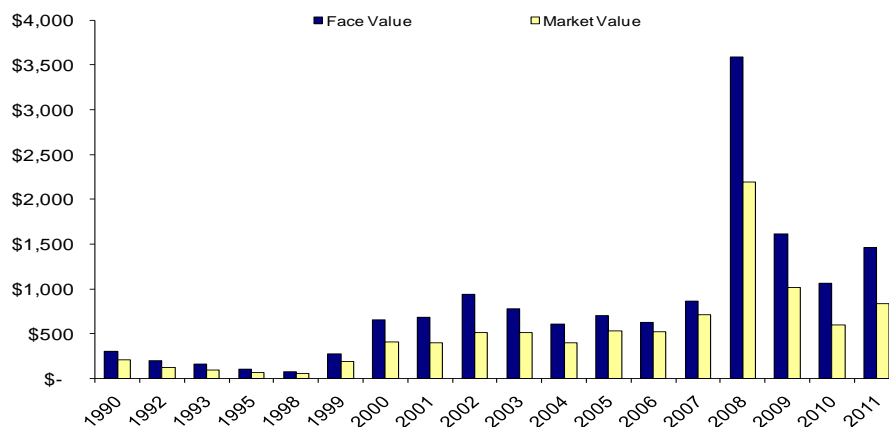
Source: NYU Salomon Center and estimates by Professor Edward I. Altman.

Our private debt estimate is based on a 2.0:1 ratio of private-to-public debt among troubled companies. Applying this ratio to our public debt totals, we estimate that the face value of private defaulted and distressed debt is \$976.2 billion. The total face value of public and private, defaulted and distressed debt as of December 31, 2011, is an estimated \$1.46 trillion (Figure 19). This is a substantial increase of about \$406 billion from one year earlier, again primarily due to the increase in the distress ratio.

As indicated in Figure 14, consistent with our observations of prices of both newly defaulted and existing defaulted bond and loan issues in our Altman-Kuehne Defaulted Debt Indexes, we have chosen to slightly decrease our market-to-face value ratios from year-end 2010, with only the ratio for distressed public debt unchanged. When applied, the market value estimate of defaulted and distressed debt

is about \$836 billion — down from the third quarter but up considerably from one year earlier (Figure 20)

Figure 20. Size of the Defaulted and Distressed Debt Market, 1990–2011 (Dollars in Billions)



Source: Professor Edward I. Altman estimates, NYU Salomon Center.

Forecasting Default Rates and Recoveries

Note: The following material is excerpted from our earlier report on “Defaults and Returns in the High-Yield Bond and Distressed Debt Market” (February 3, 2012). Readers who have already seen that report may skip this section.

Forecasting aggregate default and recovery rates is a tricky exercise that can be based on a “bottom-up” approach on individual issues and issuers or a macro, “top-down” approach – or both. For practical and track-record reasons, we have chosen the top-down approach using several techniques (models) which include aggregate amounts of new issuance over the last decade stratified by the major ratings categories (mortality statistics) and point-in-time proportions of issues by the major non-investment grade, high-yield bond categories. The latter technique is specific to only recessionary results (scenario analysis). Finally, we also analyze the information content of market-based measures, such as yield spreads and distress ratios, to forecast the near-term default performance of the market. These four techniques, or three in the case of non-recessionary expectations, are then averaged to arrive at our single default rate estimate, although the range of possible outcomes can be observed as well. Our default rate estimates are then used as inputs to form the basis for estimates of aggregate recovery rates on corporate high-yield bond defaults.

2011 Mortality Rate-Based Forecast

Using our standard mortality rate forecasting method for 2008, our forecast of 4.64% for the high-yield bond default rate was remarkably close to the actual 2008 rate, which came in at 4.65% (Figure 21). We then had expected the next year’s 2009

default rate forecast would be on the low side, using the same mortality rate methodology. After all, the mortality rate incidences of the past had been based on six recession periods covering only about six-and-a-half years of the 38 in our sample period (1971–2008). Therefore, a nonrecessionary, macroeconomic climate dominates our statistics. With a severe recession in place coming into 2009, we expected the mortality rate methodology to underestimate the actual default results. Indeed, the actual default rate was 10.74% in 2009 compared to our forecast of 7.98%, a respectable under-estimate. Since the mortality method is an actuarial smoothing technique, we know that it will not be sensitive to extreme yearly, abnormal conditions. In 2010, our estimate was considerably higher than the actual default rate as the high-yield bond market was buoyed by exceptional levels of government inspired liquidity. For these reasons, we also, when appropriate, consider recession scenario analyses and market-based statistics to provide useful estimates of future results

Utilizing the updated mortality rate statistics in Figure 28 of our first Annual Report (published on February 3, 2012) and inputting new issuance statistics per rating class over the past ten years, we estimate that the 2012 default rate will be 4.10%, with a recovery rate of about 37.1% (Figure 21). Our forecast also utilizes an estimate of the expected size of the high-yield bond market for 2012.

Figure 21. Mortality Rate-Based Forecasts of Default and Recovery Rates in the High-Yield Bond Market, 2008–2012

Year	Default Rate	Default Amount (\$ Billions)	Recovery Rate
2008 (Forecast)	4.64%	\$53.1	39.6% ^a
2008 (Actual)	4.65%	\$50.2	42.5%
2009 (Forecast)	7.98%	\$92.0	30.0% ^a
2009 (Actual)	10.77%	\$124.1	36.1%
2010 (Forecast)	5.06%	\$62.5	34.9%
2010 (Actual)	1.13%	\$13.8	46.6%
2011 (Forecast)	3.90%	\$54.8	37.6%
2011 (Actual)	1.31%	\$17.8	60.3%
2012 (Forecast)	4.10%	\$54.3	37.1%

^a Based on the log-linear and linear default/recovery rate regressions.
Source: NYU Salomon Center.

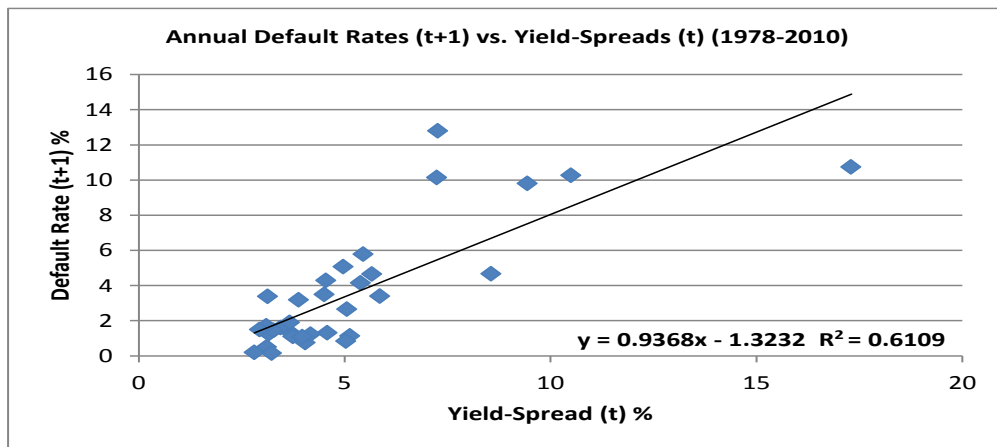
Market-Based Methods for Forecasting Defaults

In 2008, we introduced two alternative methods for forecasting default rates. The first relies on the market's spread on high-yield bonds compared to 10-yr US Treasuries. The second utilizes the proportion of high-yield bonds selling at 1,000bp over 10-yr US Treasuries (distress ratio). In both cases, we regress the market-based measure in period (t) and the subsequent one-year default rate in period (t+1).

Based on the yield-spread regression on December 31, 2007, this method predicted a 4.62% 2008 default rate, essentially a perfect forecast. As of the end of 2008, it predicted an astounding 20.81% default rate for 2009. With an update of the regressions model to include 2009's data, we recalculated our originally reported estimated default rate for the 12 months ending December 2010 to be 3.61%. As of December 31, 2010, inputting the year-end spread of 4.58% into our regression model resulted in a one-year default forecast as of December 2011 of 3.10%. Both of these forecasts were about 2% above the actual.

With this report, we have once again updated our regression model to now include 2010’s data. Inputting the year-end spread of 6.54% into our updated regression model as of December 30, 2011 (Figure 22), results in a one-year default rate forecast as of December 31, 2012 of 4.80%, higher than the mortality rate forecast.

Figure 22. Market-Based Annual Default Rate Forecast: Default Rate (t+1) Versus Yield-Spreads (t) , 1990-2010



Regression Equation:

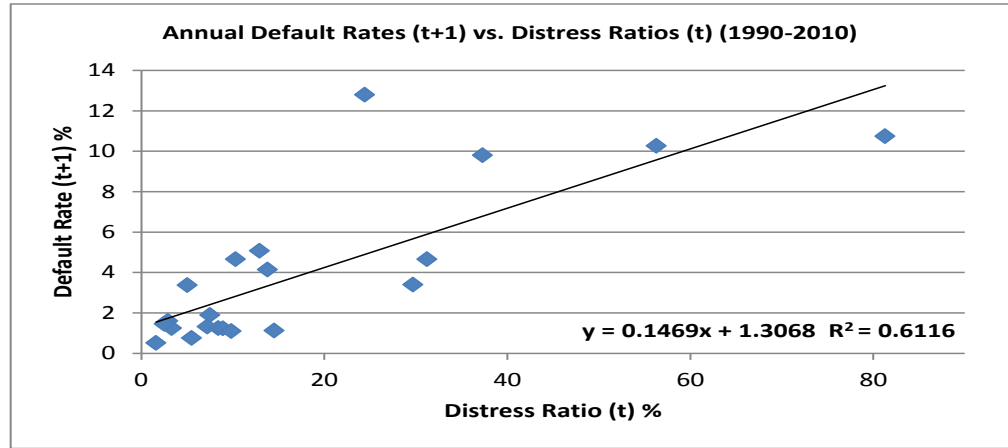
$$\text{Default Rate} = - 1.32 + 0.94 * \text{Spread}$$

$$S = 2.1868 \quad R\text{-Sq} = 61.1\% \quad R\text{-Sq(adj)} = 59.8\%$$

Sources: NYU Salomon Center and authors’ compilation.

A second market-based method utilizes the distress ratio, that is, the proportion of the high-yield bond market trading at least 1,000bp over Treasuries. Inserting the distress ratio of 17.88% as of December 30, 2011 into our regression model (Figure 23) reveals an expected 3.93% default rate for year-end 2012.

Figure 23. Market-Based Annual Default Rate Forecast: Annual Default Rate (t+1) vs. Annual Distressed Ratio (t), 1990-2010



Regression Equation:

$$\text{Default Rate} = 1.31 + 0.15 * \text{Distress Ratio}$$

$$S = 2.4115 \quad R\text{-Sq} = 61.2\% \quad R\text{-Sq(adj)} = 59.1\%$$

Sources: Bank of America Merrill Lynch & NYU Salomon Center.

Default and Recovery Conclusions

Considering the various forecasting methods, we observe that the forecast is in a relatively narrow range between 3.93% (distress ratio) and 4.80% (yield-spread). There is no obvious way to reach a consensus from the different techniques, so we simply took the average of the three to obtain our forecast of 4.28% (Figure 24). Inputting this estimate into our recovery regression (Figure 22 of our earlier Report⁹), we estimate that 2012's high-yield bond default recovery rate will be 36.7%, based on our log-linear model.

If, and when, the U.S. economy does fall into a recession, default rates will, of course, escalate. Note that we do not utilize a recession scenario technique since at the time of this writing many economists estimated that the probability of a renewed recession was at most 10-20%.

Figure 24. 2011 and One-Year Default and Recovery Forecasts: Summary of Forecast Models

Model	2011 Default Rate Forecast as of 12/31/2010	2012 Default Rate Forecast as of 12/31/2011
Mortality Rate	3.90%	4.10%
Recession Scenarios	n/r	n/r
Yield-Spread	3.10% ^a	4.80% ^c
Distressed Ratio	2.59% ^b	3.93% ^d
Average of Models (Recovery Rates) ^e	3.20% (39.8%)	4.28% (36.7%)

^a Based on 12/31/2010 yield-spread of 458.0bp. ^b Based on 12/31/2010 Distressed Ratio of 7.62%. ^c Based on 12/31/2011 yield-spread of 653.8bp. ^d Based on 12/31/2011 Distressed Ratio of 17.88%. ^e Based on the log-linear regression (Figure 22).

Sources: All Corporate Bond Issuance, Figures 28, 41-45 (of Altman-Kuehne (2012)), and Authors' Estimates of Market Size in 2012.

⁹ E. Altman and B. Kuehne "NYU Salomon Center Report on Defaults and Returns in the High-Yield and Distressed Debt Market: The Year 2011 in Review and Outlook", *NYU Salomon Center*, February 3, 2012.

