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**Special Report**

**Are Historically Based Default and Recovery Models in the High-Yield and  
Distressed Debt Markets Still Relevant in Today's Credit Environment?**

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# Are Historically Based Default and Recovery Models in the High Yield and Distressed Debt Markets Still Relevant for Investment Funds in Today's Credit Environment?

Edward I. Altman<sup>1</sup>

## Abstract

**This paper explores the impressive growth in the high-yield, leveraged loan and distressed debt markets and comments on the unusually low current default rates and high recoveries in these markets. The main reasons for these low default rates are the unprecedented growth in liquidity from non-traditional lenders, like hedge and private equity funds, as well as, again, from traditional lenders. We speculate on whether this excess liquidity will continue to dominate the market or will we observe a regression to the long-term mean and where default and recoveries will once again be based on firm-fundamental and more traditional demand/supply risk patterns.**

One of the most remarkable developments in finance in the past few decades has been the way in which high-yield “junk” bonds and securities of distressed companies have gained legitimate status as important alternative asset classes for many types of institutional investors. Nearly thirty years ago, the high-yield bond market consisted almost entirely of “fallen angels” – bonds that were investment grade at birth but whose ratings were cut as the issuing companies’ fortunes sagged. And it was tiny. Less than \$10 billion of such bonds were outstanding in the United States in 1978. But as **Figure 1** shows, the market has enjoyed spectacular growth, with about \$1 trillion in high-yield bonds outstanding in the US this year. And today, the market is dominated not by fallen angels, despite GM and Ford’s inclusion in 2005, but by newly issued non-investment grade securities. (Non-investment grade bonds are those that receive ratings from Standard & Poor’s and Fitch of below BBB-, or Moody’s ratings of below Baa3.)

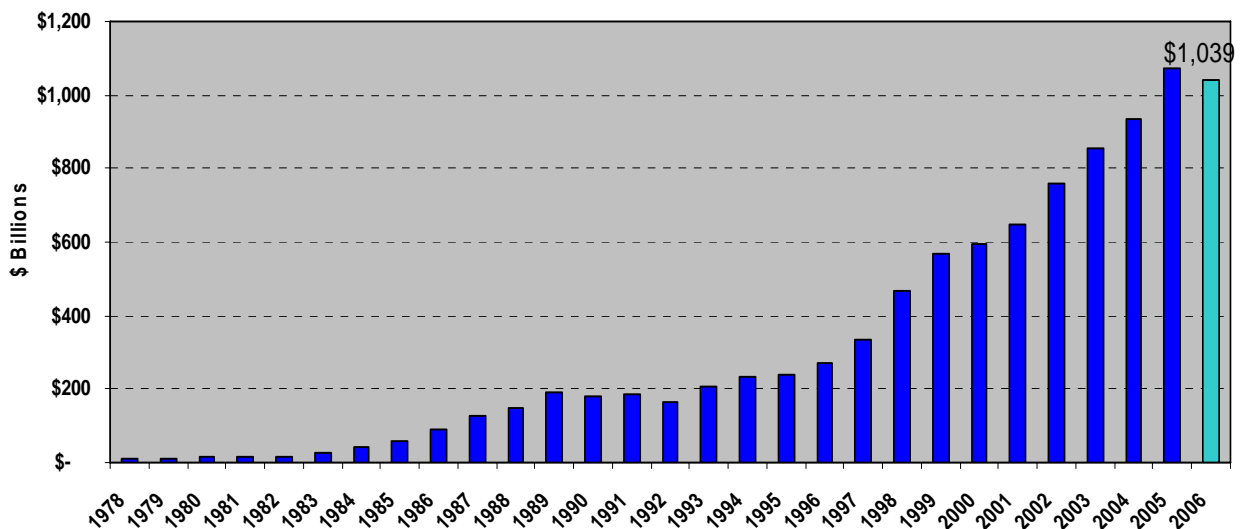
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**Figure 1**

## Size of the US High-Yield Bond Market

1978 – 2006 (Mid-year US\$ billions)



Source: NYU Salomon Center, Stern School of Business.

Companies in emerging markets and in Europe now also routinely issue these securities. The relatively favorable risk-return attributes of high-yield bonds, and of its private-debt, leveraged-loan analog, each regularly attract new annual issuance of at least \$100 billion in the US and increasing amounts abroad. In addition, the US has seen a substantial rise in the size of the syndicated loan market. Syndicated lending has risen more than 60 percent in the last three years and rose to total outstandings of \$1.5 trillion in 2005. The growth in this sector has been

paced by more risky leveraged loans. Leveraged loans, defined as loans of \$100 million or more of companies with non-investment grade bonds outstanding, or whose loans yield at least 125 basis points (1.25%) over an appropriate risk-free benchmark, are now estimated to be about \$500 billion, or about one-third of the total syndicated loan market in the US. These higher risk and return loans are increasingly being financed by non-bank financial institutions, such as CLO (collateralized loan obligation) hedge funds. While large banks typically arrange these highly leveraged syndicated loans, in recent years more than three-quarters of the funds have been provided by non-bank institutions.

In another sign of growth and maturity of speculative grade fixed-income debt securities as an asset class, a new breed of distressed debt investors, called “vulture” funds, has emerged as one of the fastest growing sectors of the burgeoning hedge fund and private equity field.

Distressed debt is a sub-group of the high-yield bond market and is defined as securities that yield at least 10 percent (1,000 basis points) above the risk-free rate benchmark, and defaulted debt is defined as securities that trade after the issuing firm has missed an interest payment and/or has filed for bankruptcy. In the United States alone, we estimate that as of June 30, 2006, the size of the distressed and defaulted debt markets was about \$620 billion in face value and about \$500 billion in market value. See **Figures 2 and 3** for recent distressed debt market size estimates and a time-series since 1990. A similar amount, or more, is also attracting investors in Asia, particularly to non-performing loans of Japanese and Chinese banks, and in Europe from German and Italian banks, among others. There are today at least 160 investment funds in the US and another 25-30 in Europe that specialize in investing in distressed securities. This compares to about 100 in the US in 2000 and about 60 in 1990, and probably just a few in Europe five years ago.

## Figure 2

### ESTIMATED FACE AND MARKET VALUES OF DEFAULTED AND DISTRESSED DEBT 2004-2006 (\$ billion)

	<u>Face Value</u>			<u>Market Value</u>			Market/Face Ratio
	12/31/2004	12/31/2005	6/30/2006	12/31/2004x	FV12/31/2005	6/30/2006	
<b>Public Debt</b>							
Defaulted	\$ 152.0	\$ 170.4	\$ 165.6 <sup>(1)</sup>	\$ 76.0	\$ 93.7	\$ 107.6	0.65 <sup>(4)</sup>
Distressed	\$ 36.6	\$ 49.3	\$ 27.8 <sup>(2)</sup>	\$ 23.8	\$ 34.5	\$ 19.5	0.70 <sup>(4)</sup>
<b>Total Public</b>	<b>\$ 188.6</b>	<b>\$ 219.7</b>	<b>\$ 193.4</b>	<b>\$ 99.8</b>	<b>\$ 128.2</b>	<b>\$ 127.1</b>	
<b>Private Debt</b>							
Defaulted	\$ 334.4	\$ 374.9	\$ 364.3 <sup>(3)</sup>	\$ 234.1	\$ 299.9	\$ 309.7	0.85 <sup>(4)</sup>
Distressed	\$ 80.6	\$ 108.5	\$ 61.2 <sup>(3)</sup>	\$ 68.5	\$ 97.6	\$ 55.1	0.90 <sup>(4)</sup>
<b>Total Private</b>	<b>\$ 415.0</b>	<b>\$ 483.3</b>	<b>\$ 425.5</b>	<b>\$ 302.6</b>	<b>\$ 397.5</b>	<b>\$ 364.8</b>	
<b>Total Public and Private</b>	<b>\$ 603.6</b>	<b>\$ 703.0</b>	<b>\$ 618.9</b>	<b>\$ 402.4</b>	<b>\$ 525.7</b>	<b>\$ 491.9</b>	

(1) Calculated using: (2005 defaulted population) + (1H 2006 defaults) - (1H 2006 Emergences)

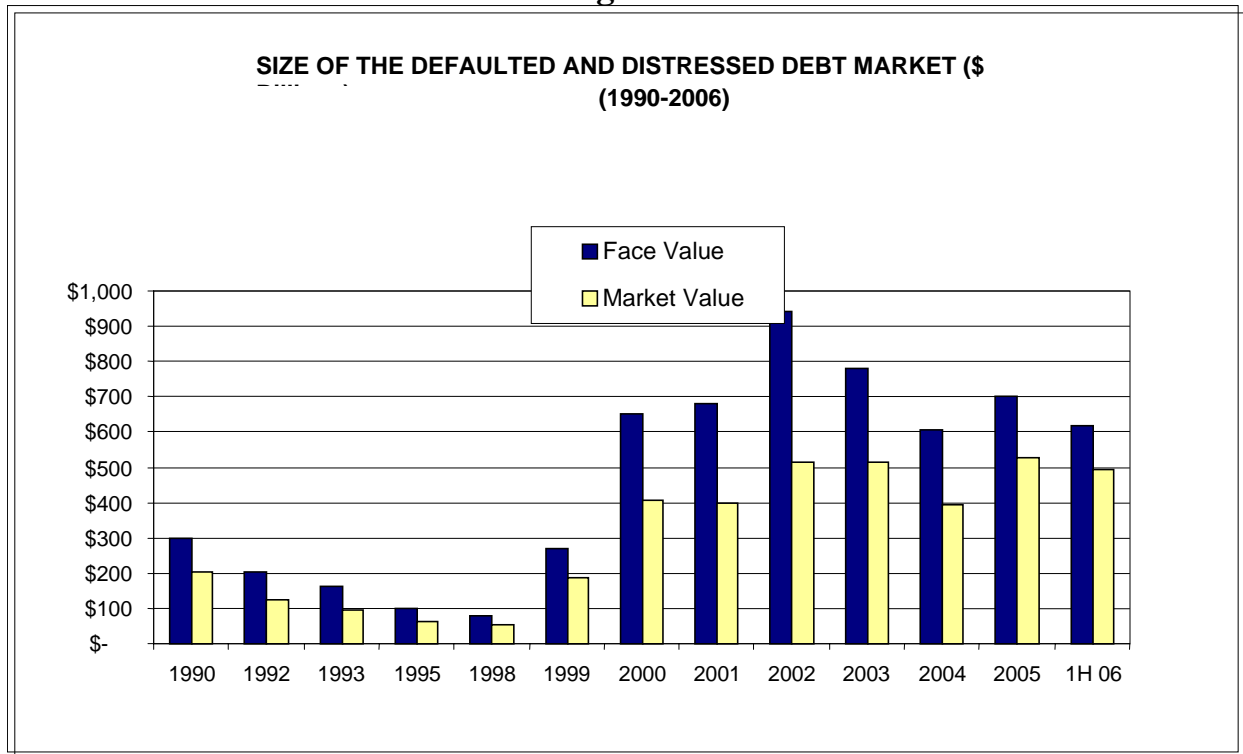
(2) Based on 2.80% of the high yield bond market (\$993.6 billion)

(3) Based on a private/public ratio of 2.2.

(4) The market/face value ratio was 0.55 for public defaulted debt, 0.70 for public distressed debt, 0.80 for private defaulted debt and 0.90 for private distressed debt in 2005

Sources: Estimated by Professor Edward Altman, NYU Stern School of Business from NYU Salomon Center's Defaulted Bond and Bank Loan Databases

## Figure 3



Source: E. Altman, NYU Salomon Center

The impressive growth in low-grade and distressed debt has spurred the development of statistics, analytics, and models that seek to explain and predict these markets' size and risk-return trade-offs. Investors are constantly focusing on the outlook of these markets in order to develop strategies and to use market forecasts to attract new capital. Over the years, I have constructed numerous models and forecasts for the assessment of market dynamics of high-yield and distressed debt. Until very recently, these models have been quite accurate (our annual reports can be seen at the website of NYU Stern's Salomon Center for the Study of Financial Institutions) <http://www.stern.nyu.edu/salomon>. Forecasts of default and recovery rates on defaulted bonds that use mortality-actuarial methods<sup>2</sup> and statistical regression techniques<sup>3</sup> are now well known and accepted by market participants and scholars.

As is readily apparent from examining the history of high-yield bonds, however, markets are dynamic and constantly shifting. And there are times when even the most carefully constructed and tested forecasting models can be off the mark. The last few years have been one such period. Given the unique environment in the credit markets during the last several years, which has been fueled by massive liquidity and the advent of new participants like hedge funds, it is worth asking whether historically based estimates of default probabilities and recovery rates are still relevant for banks and hedge funds.

### **Changing Forces**

Traditional measures of defaults and default rates involve the comparison of the dollar amount of defaults from a particular market, such as the high-yield bond market, with the amount outstanding as of the beginning or the mid-point in a year. **Figure 4** shows our default rate calculation from 1971 to the third quarter of 2006, and indicates that the weighted average

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<sup>2</sup> See E. Altman (1989).

<sup>3</sup> See E. Altman, B. Brady, A. Resti and A. Sironi (2002, 2005).

## Figure 4

### HISTORICAL DEFAULT RATES - STRAIGHT BONDS ONLY EXCLUDING DEFAULTED ISSUES FROM PAR VALUE OUTSTANDING 1971 - 2Q 2006 (\$ MILLIONS)

YEAR	PAR VALUE OUTSTANDING (a)	PAR VALUE DEFAULTS	DEFAULT RATES	
2006	\$993,600	\$5,034	0.506%	
2005	\$1,073,000	\$36,181	3.372%	
2004	\$933,100	\$11,657	1.249%	
2003	\$825,000	\$38,451	4.661%	
2002	\$757,000	\$96,858	12.795%	
2001	\$649,000	\$63,609	9.801%	
2000	\$597,200	\$30,295	5.073%	
1999	\$567,400	\$23,532	4.147%	
1998	\$465,500	\$7,464	1.603%	
1997	\$335,400	\$4,200	1.252%	
1996	\$271,000	\$3,336	1.231%	
1995	\$240,000	\$4,551	1.896%	
1994	\$235,000	\$3,418	1.454%	
1993	\$206,907	\$2,287	1.105%	
1992	\$163,000	\$5,545	3.402%	
1991	\$183,600	\$18,862	10.273%	
1990	\$181,000	\$18,354	10.140%	
1989	\$189,258	\$8,110	4.285%	
1988	\$148,187	\$3,944	2.662%	
1987	\$129,557	\$7,486	5.778%	
1986	\$90,243	\$3,156	3.497%	
1985	\$58,088	\$992	1.708%	
1984	\$40,939	\$344	0.840%	
1983	\$27,492	\$301	1.095%	
1982	\$18,109	\$577	3.186%	
1981	\$17,115	\$27	0.158%	
1980	\$14,935	\$224	1.500%	
1979	\$10,356	\$20	0.193%	
1978	\$8,946	\$119	1.330%	
1977	\$8,157	\$381	4.671%	
1976	\$7,735	\$30	0.388%	
1975	\$7,471	\$204	2.731%	
1974	\$10,894	\$123	1.129%	
1973	\$7,824	\$49	0.626%	
1972	\$6,928	\$193	2.786%	
1971	\$6,602	\$82	1.242%	Standard Deviation
<b>ARITHMETIC AVERAGE DEFAULT RATE</b>		<b>1971 TO 2005</b>	<b>3.236%</b>	<b>3.089%</b>
		<b>1978 TO 2005</b>	<b>3.560%</b>	<b>3.301%</b>
		<b>1985 TO 2005</b>	<b>4.352%</b>	<b>3.424%</b>
<b>WEIGHTED AVERAGE DEFAULT RATE (b)</b>		<b>1971 TO 2005</b>	<b>4.651%</b>	
		<b>1978 TO 2005</b>	<b>4.669%</b>	
		<b>1985 TO 2005</b>	<b>4.727%</b>	
<b>MEDIAN ANNUAL DEFAULT RATE</b>		<b>1971 TO 2005</b>	<b>1.896%</b>	

**Notes**

(a) As of mid-year.

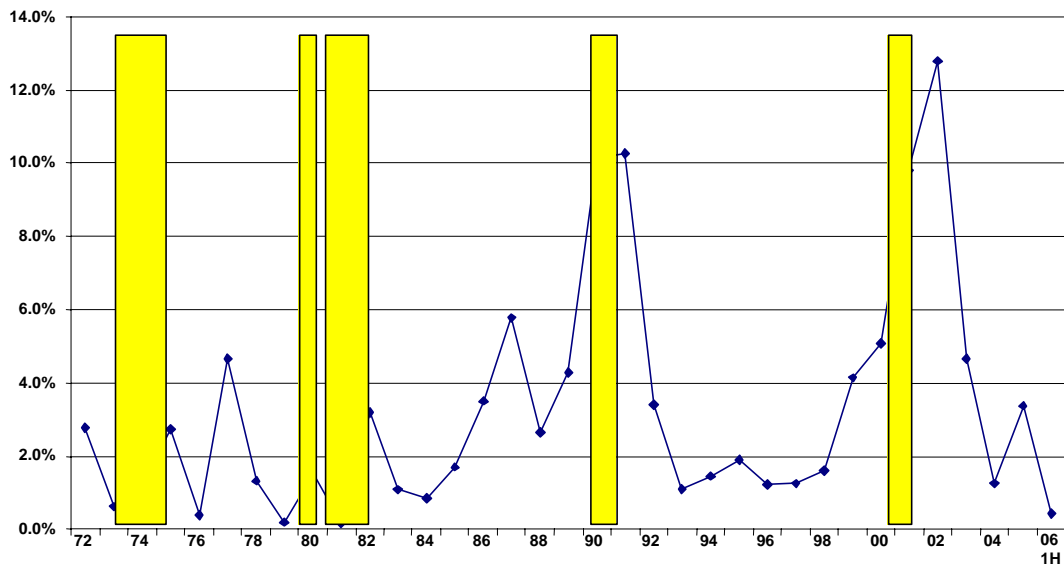
(b) Weighted by par value of amount outstanding for

Source: E. Altman, NYU Salomon Center

default rate over the 36-year period is about 4.65 percent per year. The rate was a minuscule 0.42 percent for the first half of 2006. An alternative method, used by most rating agencies, involves the *number* of high-yield issuers rather than the dollar amount of defaults. And, this rate is also currently very low.

Historically, the default rate has experienced spikes in periods when the economy was entering a recession or a slowdown. This certainly was the case in 1990-91 and again in 2001-02, but in both instances, the increase in default rates began several years before the recession. Indeed, as can be seen in **Figure 5**, it is clear that it is not necessary for the economy to experience a recession for the default rate to begin its climb toward problem levels.<sup>4</sup>

**FIGURE 5**  
**HISTORICAL DEFAULT RATES AND RECESSION PERIODS IN**  
**HIGH YIELD BOND MARKET 1972 - 2006 1H**



**Periods of Recession: 11/73 - 3/75, 1/80 - 7/80, 7/81 - 11/82, 7/90 - 3/91, 4/01 - 12/01.**  
 Source: Figure 4 & National Bureau of Economic Research.

<sup>4</sup> We have discussed this phenomenon in many of our Annual updates on the high-yield market and Fridson (2006) has also provided commentary to this effect.



We can observe that the default rate since 2002 has been relatively low, especially in 2004 to 2005, with the exception of some rather large bankruptcies that contributed high amounts of defaults in the second-half of 2005, among them Delta and Northwest Airlines, auto parts maker Delphi, and the energy company Calpine. And in the first half of 2006, the default rate was extremely low by historical standards. Yet, using an actuarial-mortality rate approach that we developed in 1989 (which has been quite accurate in most years), we have consistently over-estimated default rates in recent years, with the exception of 2005. This technique analyzes the credit quality of new issues in the entire corporate bond market. We estimate future defaults based on the historical incidence of defaults to these new issue, credit quality cohorts. In other words, by examining the quality of newly sold bonds at a given time, we have generally been able to project the rate of default for future periods, like insurance actuaries estimate life expectancy. For example, **Figure 6** shows that the proportion of newly issued “junk” bonds rated B- or below (the so-called bad cohort) has risen sharply starting in 2002, which would normally indicate increased defaults two to four years after issuance. But the expected increase in defaults that the data implies simply has not manifested. Why?

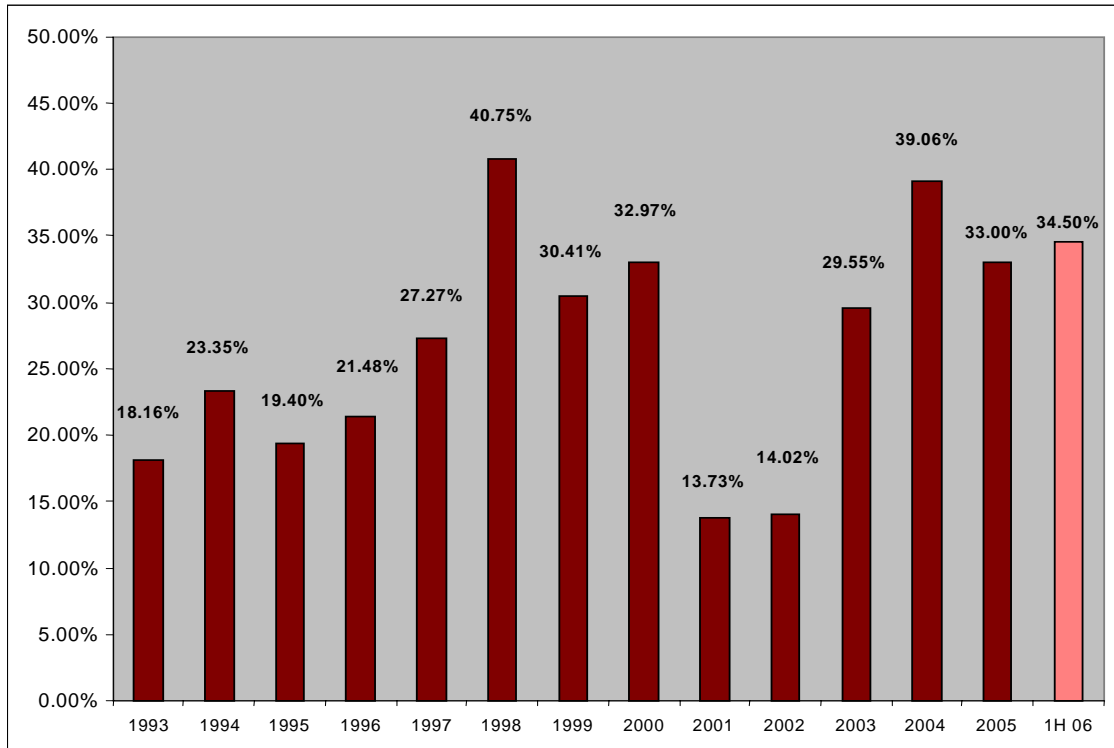
One possible reason is that the rating agencies have become more stringent in their criteria for assigning the various credit ratings, especially in the aftermath of some criticisms of their performance in the 2001-2002 credit debacles and huge default rates. So, it is argued, low rated companies today have better risk profiles than their earlier counterparts. The evidence supporting this assertion is not conclusive, however.<sup>5</sup>

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<sup>5</sup> While most average ratios of low-rated companies in 2002-2004 are stronger than in 1998-2000, there are some notable exceptions (e.g., EBITDA interest-coverage-S&P data).

**Figure 6**

**Percentage of New High Yield Issues Rated B- or Below Based On Amount of Issuance (1993-1H 2006)**



Source: Standard & Poor's, New York.

### **Increased Liquidity: The Impact of Hedge and Private Equity Funds**

To answer this question more convincingly, it helps to look at trends in the investing and credit landscape. The lower default rates have coincided with a rise in the number and size of hedge funds and private equity firms that employ related investment strategies. The driving force behind all of these strategies is the enormous increase in liquidity stimulated by the quest for higher yields and returns. The presence of so many investors with large amounts of money to deploy in the sector has, in the short run, along with a fairly robust economy and persistently low

interest rates, lessened the incidence of defaults. (Both the robust economy and the persistently low interest rates have recently shown clear signs of change.) Indeed, the huge returns observed on low-quality assets in 2003, and the impressive but somewhat lower returns in 2004, has fueled an already frothy distressed debt market in the aftermath of the enormous increase in defaults in 2001 and 2002.

In recent years, highly leveraged homeowners have been less likely to default on their mortgages because the mortgage industry continually develops new products or revitalizes existing products that allow them to restructure debt. A similar dynamic is taking place in the high-yield debt market, where companies in distress have a wider range of options – beyond default. Until recently, firms that got into trouble went to their traditional sources of financing – banks, insurance companies and bond markets – to provide refinancing packages that could rescue them from temporary stressed conditions. But in the aftermath of the enormous default and loss experience of the early years of this decade, these traditional sources were reluctant to lend to newly distressed firms. Non-traditional sources, such as distressed debt hedge funds, saw an opportunity to fill the rescue-financing void at attractive yields – e.g., double the spreads on comparably rated companies. And, in a reversal, traditional debt sources have recently returned to financing risky, highly leveraged transactions.

Investors, flush with new capital infusions after they posted huge returns in 2003, had proven more willing to take subordinated positions than the traditional senior-secured lender. This has accounted for the impressive growth in the second-lien market of notes and bonds. These loans are being made at 350-450 bp over LIBOR in 2006 and in order to hit the funds' target rates of return, leverage of two to three times the investment is commonly utilized. Investors argue that private rescue financing packages (e.g., notes with warrants attached) can be

structured to ensure relatively high recoveries if the rescue financing is not successful. Still, it is easy to observe that recent public and private financings have very weak or no protective covenants. Is the time bomb ticking away? Or, has the emergence of the insurance market for corporate risk, i.e., the credit default swap hedging mechanism, provided the requisite backdrop to embolden investors even more?

### **Corporate Governance and Active Investing**

Investors aren't just seeking to keep leveraged companies on life support; they are seeking to use high-yield debt as a means of getting involved with corporate governance by taking control of companies. "Active investing" has always been evident in distressed investing. There are numerous anecdotes of successful ventures, whereby the debt investor with large positions uses its position to influence the valuation of the reorganized company to receive a greater slice of the emerged-company pie. In some circumstances, including Sunbeam, Kmart, Barneys, and LTV/Bethlehem Steel, the active investor was also involved in a control situation – i.e. the investor winds up running the company when it emerges from bankruptcy.

Or, active distressed debt hedge funds have provided rescue equity buyouts, further reducing the default rate. For example, Asprey & Garrard, the venerable English luxury jewelry retailer, was recently rescued by an American distressed hedge fund, Plainfield Asset Management. And, General Motors is in the process of selling a majority stake in its finance unit, GMAC, to Cerberus Capital, a huge hedge fund/private equity firm that specializes in distressed situations. The one-year probability of a GM default was considerably greater before the announcement of the proposed sale to Cerberus. It is less clear, however, if the longer-term outlook for GM was improved by this important transaction. Other recent rescues or

restructurings involved Solutia Corp., Foster Wheeler, Granite Broadcasting, Saltan Corp, Merisant, Radnor, Pope & Talbot and Techniplex, among others.<sup>6</sup>

Success in these ventures has motivated more traditional private equity firms to enter the distressed firm space. And that has led to more purchases of distressed firms that investors believe can be viable, given new management and a new capital structure. This additional liquidity in the distressed firm market, both from traditional and non-traditional “vultures,” has no doubt reduced the number of defaults from the levels that might be expected.

### **The New Bankruptcy Code of 2005**

Another factor, albeit intangible, that could impact default related forecasts vs. actual results, especially with respect to default recovery rates, is the new Bankruptcy Code. On October 17, 2005, the Bankruptcy Abuse Prevention and Consumer Protection Act (BAPCPA) went into effect with a clear indication that creditors would be favored over debtors, both individual and corporate. Just about every bankruptcy law firm provided primers on the new Code dealing with such issues as limiting the debtor exclusivity period (18 months) with respect to filing the reorganization plan, leasehold rights, management compensation and other incentives, etc. For a discussion of these and other aspects, see Altman and Hotchkiss (2005). So, an existing or potential creditor of a distress firm would have heightened expectations of recovery should the firm file for bankruptcy or, once filed, what would be the ultimate recovery compared to the situation before BAPCPA went into effect. Since just about all of the data that has gone into constructing and testing recovery models was pre-2005, this intangible, but potentially important factor, could conceivably play a role in forecasted accuracy levels (see our discussion at a later point on recovery models).

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<sup>6</sup> It should be noted that “rescue” financings do not always result in an ultimately successful restructuring. For example, Granite and Radnor ultimately defaulted in 2006.

## **New Paradigm?**

The greater liquidity can be a double-edged sword. While it is certainly saving some firms from default, it could be laying the groundwork for more potential defaults down the road. Aggressive financing packages for struggling companies and merger activities of seemingly healthy entities are adding significant new leverage to corporate balance sheets. Indeed, we are seeing the return of the mega-LBOs that we last saw in the mid and late 1980's. Debt to cash flow ratios have risen to above six in many of these transactions.<sup>7</sup> Our research has shown that unless debt is reduced to manageable levels in two to four years after the highly leveraged transactions<sup>8</sup>, we could experience firm meltdowns similar to what we saw in 1990 and 1991, years in which the default rate rose to approximately 10 percent. While we are not forecasting 10% default rates anytime in the near future, we do expect these rates to spike starting in 2007. This will be even more likely if the economy itself experiences a coincidental slowdown and interest rates rise. In the meantime, however, default rates remain very low.

## **Back to the 80's?**

The recent vintage of rescue financings and large firm LBOs are somewhat reminiscent of the mid-to-late 1980 "restructurings" and buyouts championed by the junk-bond powerhouse firm, Drexel Burnham Lambert. Drexel set up a special unit to deal with problem companies (using private transaction Section 3(a)(9) exchange offerings) whose original financings were underwritten by the firm. The objective clearly was to minimize the formal default rate calculations that were used as a barometer of the health of the high-yield bond market.

Eventually, a relatively large number of these "temporary-fixes" crumbled under the weight of

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<sup>7</sup> For example, three recent mega-LBOs, Univision, Sun Gard and VNU, had debt to EBITDA ratios significantly greater than six. For large LBO loans (issuers with EBITDA of \$50 million or more), the average Debt/EBITDA ratio in 2000 was 4.3X and in 2Q-2006, it was 5.6X (S&P, LCD data). The average proportion of equity in the deals, however, remained about 30% until just recently in 2006 when the ratio dropped to 20-25% on many deals.

<sup>8</sup> See E. Altman and E. Hotchkiss (2005).

deteriorating firm fundamentals and Drexel's own demise as the entire market suffered in the early 1990's.

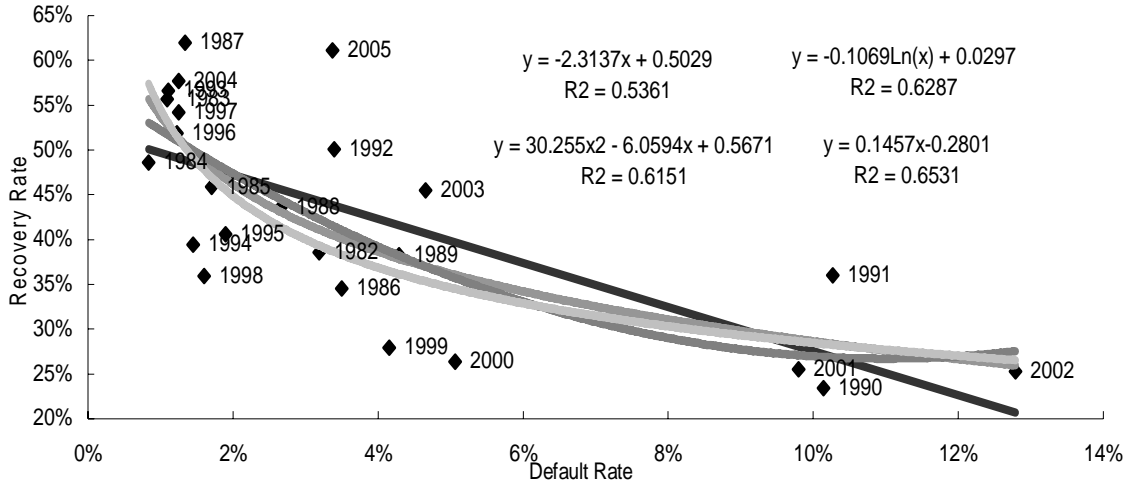
### **Recovery Rate Models and Trends**

A crucial metric for investors in this arena is the percentage of the face value of defaulted debt that will be paid back if there is a default - the recovery rate. Our research has clearly shown a significant negative correlation between coincident default and recovery rates. In other words, when default rates rise, recovery rates fall; and vice versa. Here, again, however, the dynamics seem to be changing. Forecasted recovery rates based on a supply/demand relationship for defaulted securities were quite accurate until 2005. But in 2005, our forecasted recovery (about 40-45 percent) was much lower than the actual rate of about 60 percent (see **Figure 7**). And, in 2006, through the third quarter, the weighted average recovery rate on an admittedly small number of defaults (23) is over 70% on defaulted bonds and considerably higher on defaulted loans. Even the unusually low default rate of barely 0.5% through three quarters would not have predicted these levels. This is another example in which the use of historical data has proved problematic in today's unusual environment.

Figure 7

### Recovery Rate/Default Rate Association

Defaulted Bonds Data Set (1982–2005), Dollar-Weighted-Average Recovery Rates to Dollar-Weighted-Average Default Rates



Source: *The Link Between Default and Recovery Rates*, E. Altman, B. Brady, A. Resti, and A. Sironi, NYU Salomon Center, working paper S-03-4, 2003 and *Journal of Business*, November 2005.



## **Conclusion**

The key question today, therefore, is whether the benign credit environment, fueled by significant liquidity from traditional and non-traditional institutions, will continue to materially impact the default and recovery rates in the high-yield, leverage-loan and distressed debt markets. Or will the “hot” money from non-traditional lenders recede, moving to other uses – commodities, alternative energy stocks, emerging markets, hybrid securities or real estate –and the more normal default and recovery patterns return based on firm fundamentals. I believe that the latter scenario will manifest, perhaps as early as in 2007. If we observe disappointing returns to highly leveraged and rescue-financing packages, some of the hedge funds may find it difficult to cover their own loan requirements as well as the likely fund withdrawals. And broker-dealers who are not only providing the leverage to hedge funds but whom are also investing in similar strategy deals will recede from these activities. But as investment managers like to say, the past is not necessarily a perfect guide to future performance. The question is which past will manifest in the next few years. Will it be the longer patterns of the past 30 years or will the most recent past continue to dominate? I have always believed in “regression to the mean,” and in this case I mean the long-term mean and not the average of the recent past.

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