Historic Changes in the High Yield Bond Market

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The "modern" high-yield (HY) bond market in the U.S. is a relatively new asset class, certainly when compared to the equity and investment-grade (IG) bond markets, both of which were well established in the 1800s. The beginnings of the HY bond market as we know it are generally traced to the late 1970s or early 1980s when it became possible for a wide cross section of public companies to issue non-investment grade bonds. The purpose of this paper is to contribute to the high-yield bond literature by analyzing the evolving characteristics of this market and considering the implications of some recent historic changes for issuers, analysts, and investors.

We begin by reviewing studies that have examined the investment performance of HY bonds over time. Our analysis of the overall growth of the HY bond market shows strong but markedly cyclical growth as well as a notable change in the composition of the asset class toward lower-risk Ba-rated bonds. Consistent with this development, studies of the performance of HY bonds show Ba-rated bonds experiencing not only lower risk, but also higher returns than Caa-rated bonds, which have produced surprisingly low average returns along with exceptionally high volatility. At the same time, studies of the correlation of HY bond returns with returns on other major asset classes report that HY bonds have consistently stronger relationships with common stocks (especially small-cap stocks) than with Treasuries and investment-grade bonds. The research also shows that, although HY and IG bonds have experienced similar levels of volatility during stable economic periods, HY bond volatility tends to explode during periods of economic uncertainty, with Caa-rated bonds accounting for most of the sharp increases in volatility.

We also considered the promised yield spread on HY bonds relative to Treasury bonds, commonly referred to as the credit risk spread (CRS). Our analysis shows that the CRS series is very volatile, has a non-normal distribution, and is highly sensitive to the business cycle. One notable development was a recent change in the timing relationship between credit risk spreads and default rates. During the recessions of 1990-91 and 2001-2002, sharp increases in credit spreads pretty much coincided with spikes in default rates. By contrast, the dramatic increase in CRS (to an historic high) in late 2008 took place well before the first major hike in default rates in mid-2009—and since that time, credit risk spreads have fallen sharply while defaults have been on a clear upward trend. Finally, the research documents a strongly negative relationship between default rates and recovery rates on HY bonds that has compounded the cyclicality of their returns.

For investors and analysts, perhaps the most striking finding in our report is the large element of cyclicality in volatility and returns, and its relationship to the business cycle. To the extent investors are better able than most to anticipate ups and downs in the economy, one may also be able to use historical patterns in CRS to avoid risks and take advantage of return opportunities resulting from the large swings in the CRS over the business cycle. Finally, the recent apparent breakdown in the close relationship between the CRS and HY default/recovery rates suggests that investors should give more consideration to other variables that also affect CRS—notably, general liquidity and capital market risk.

Studies of HY Bond Performance

The large academic literature on the performance of HY bonds can be divided into several themes. Early studies generally reported that HY bonds experienced higher returns than investment-grade bonds and had higher risk, as indicated by the greater volatility of returns.[1] The major surprise in this research was that the volatility of HY bond returns as a class has been lower than one might expect over the entire period of analysis.

A second group of studies examined HY bond defaults and their effects on total investor returns.[2] Apart from a controversy about how to measure the default rate (with some advocating use of cumulative default rates over several years in place of the more conventional average annual default rates), the results show that the credit risk of HY bonds has been substantially greater than that of investment-grade bonds, and that there has been a pronounced cyclical pattern in default rates.[3] These studies also extended the analysis of defaults to

* The authors acknowledge the data provided by Barclays Capital and Moody's, as well as data and comments from Edward Altman.

1. See Blume-Keim, (1991b), Cornell (1992), and Reilly-Wright (1994, 1999).
2. These included studies by Altman and Nammacher (1985), Altman (1990, 1991), Asquith, Mullins and Wolf (1989), Blume-Keim (1991a), Cheung, Bencivenga and Fabozzi (1992), and Fridson (1992, 1994).
3. See Altman and Kishore (1996), Altman, Brady, Rasti and Sironi (2005), and Moody's (2009)

Exhibit 1 **Annual Global High Yield Market New Issue Dollar Volume by Principal Amount 1977–2008**

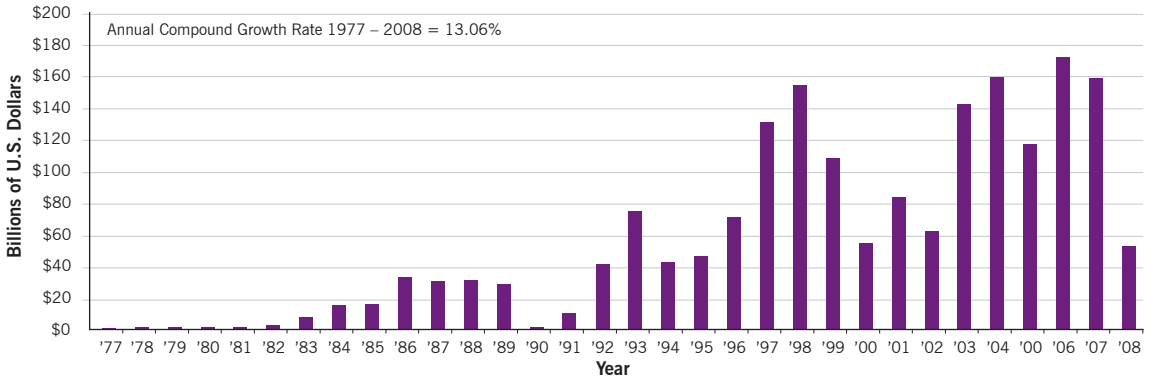
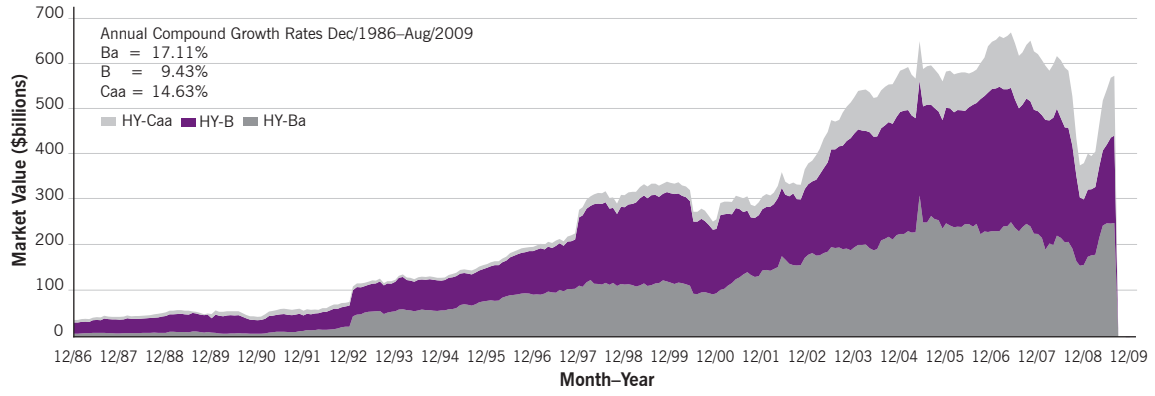


Exhibit 2 **Market Value of the Barclays Capital High Yield Ba, B, and Caa Bonds (in $ billions) Dec. 1986–Aug. 2009**



consider the recovery rates on the defaulted bonds and the effect of these recovery rates on HY bond losses. A notable finding in this regard was a significant negative relationship between default rates and recovery rates—in other words, the higher the default rate in a given period, the lower the recoveries on the defaulted bonds.

A third set of studies considered portfolio effects by examining the correlations among the returns on HY bonds and the returns on other asset classes, mainly common stocks and investment-grade bonds.[4] These studies showed that although the returns of HY bonds were positively correlated with those of IG bonds, the HY bond returns had a significantly stronger relationship to the returns on common stocks, especially small cap stocks. At the same time, studies that examined the correlations of HY bonds with other assets found significant differences in the correlations among the three different credit rating classes of HY bonds: Ba, B, and Caa. For example, whereas the returns on Ba-rated bonds were highly sensitive to changes in Treasury yields, the returns on B and Caa-rated bonds were minimally affected by Treasury interest rate changes, but highly correlated with the returns on common stocks.

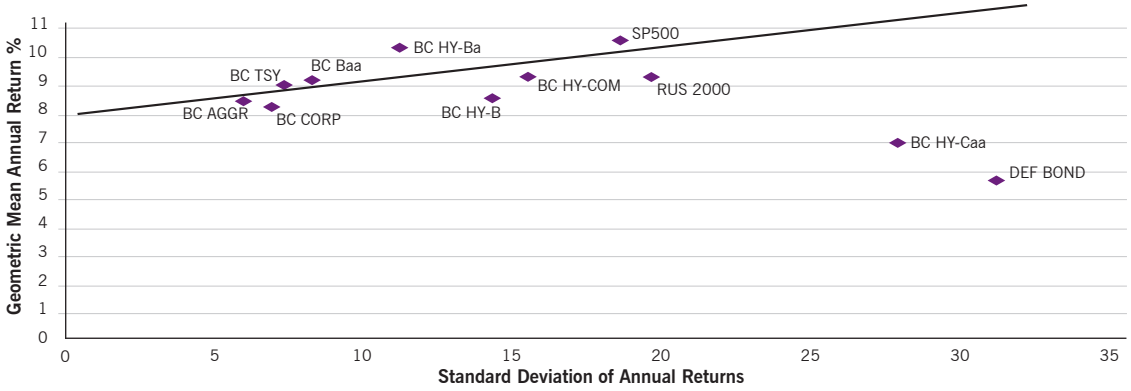
Overall Growth and Changing Market Composition

Since its emergence in the late 1970s, the HY bond market has experienced strong but cyclical growth. As can be seen in Exhibit 1, which shows the new HY bond issuance for each year since 1977,[5] the first major growth phase took place from 1983 to 1989, with subsequent declines during the recession years of 1990-91, 2001-2002, and 2008 to mid-2009. While the compound annual growth of new HY bond issuance has exceeded 13%, the flow has been very sensitive to the economic environment. With a current outstanding value of about $1.1 trillion, HY bonds are clearly a significant compo-

4. These included studies by Altman (1992), Fridson (1994), Reilly and Wright (2001), and Shane (1994).

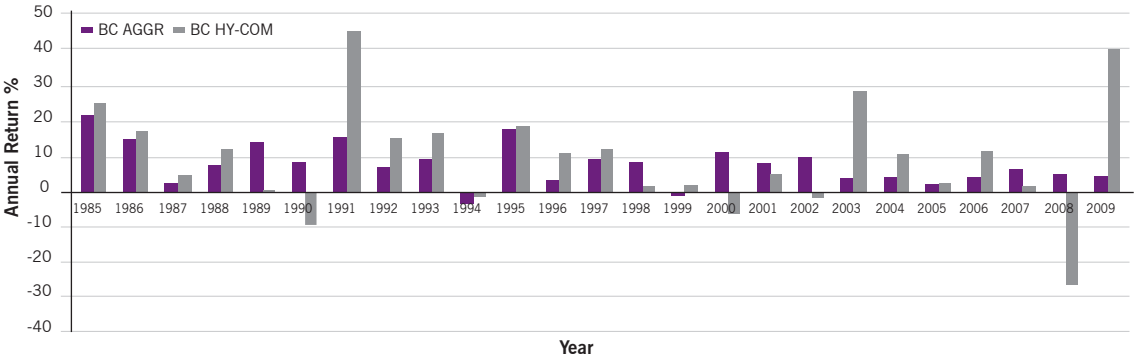
5. Exhibit 1 in the appendix lists the stock and bond market indexes used in this study. With the exception of the Altman Defaulted Bond Index, all of the rate-of-return series include monthly data for at least the 24-year period 1985 through August 2009.

Exhibit 3 **Scatter Plot of the Geometric Mean Annual Returns Versus the Standard Deviation of Annual Returns for Alternative Stock and Bond Indexes (1985–Aug. 2009)**



NOTE: The line represents the regression line of all of the points except BC HY-Caa and DEF BOND. The regression line has the following equation and t-statistics:
Y = 7.81 + 0.088 X
(13.54) (1.95)
R-square = .35
NOTE: DEF-BOND excludes 1985 & 1986 returns.

Exhibit 4 **Comparison of Annual Returns: Aggregate Investment Grade Bonds and Composite High Yield Bonds (1985–Aug. 2009)**



nent—representing as much as 25%—of the U.S. corporate bond market.

As shown in Exhibit 2, the growth in the overall HY market can be decomposed into its Ba, B, and Caa-rated components.[6] From 1987 (the first year for which such segmented information is available) to the present, the aggregate value of the HY bond market has grown at an annual compound rate of almost 11%. While B-rated bonds have constituted the largest percentage of total market value during most of this 22-year period, they have declined as a percentage of the HY market, falling from 65% to 44%. At the same time, Ba-rated bonds have increased from about 19% of the total HY market in 1986 to 33% in 2009. And confirming this pattern, the growth rate for Ba-rated issues during this 22-year period was 17.1%, as compared to just 9.4% for Bs and 14.6% for Caas. The Caa-rated proportion has experienced a fairly cyclical pattern over time, starting at 15% in 1986, declining to a low of about 3% in 1993 and then increasing to its peak of just over 23% in August 2009.

These results have two contrasting implications. The first is that, thanks to a significant shift from B to Ba-rated bonds, there has been a secular increase in the overall credit quality of this market. At the same time, the current record proportion

6. These data were originally from Lehman Brothers (now Barclays) that provide a breakdown by rating category. As such, they are based upon the bonds included in the widely-used bond index database that we will henceforth refer to as the Barclays Capital Indices. For details of the rebranding of the indices, see (Barclays, 2008).

Exhibit 5 **Comparison of Annual Returns: Ba, B, and Caa Rated High Yield Bonds (1985–Aug. 2009)**

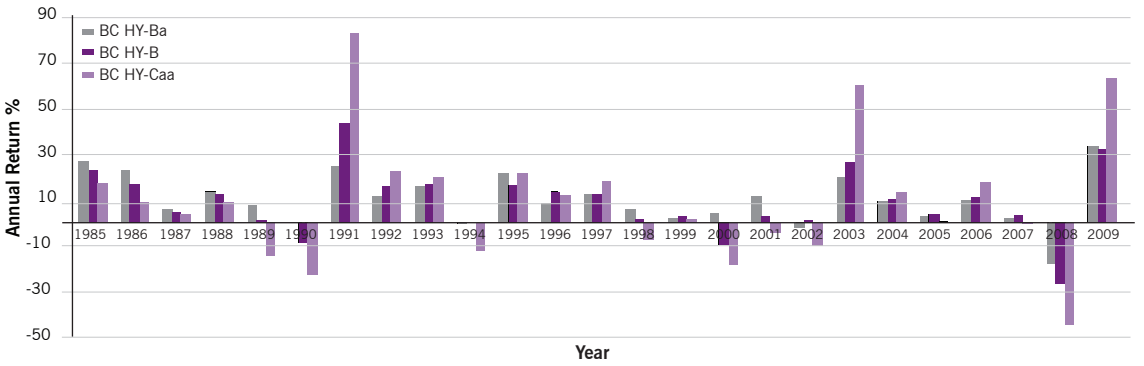
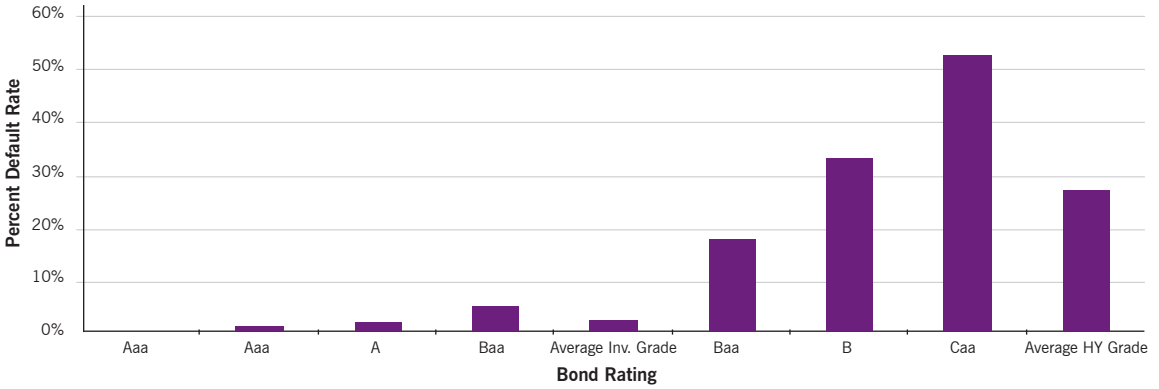


Exhibit 6 **Static Pools Cumulative 10-Year Average Bond Default Rates**



of Caa-rated bonds could lead to significantly higher default rates in the future.

Risks and Returns

Exhibit 3 reports the risks and returns for several stock and bond series for the almost 25 year period from January 1985 through the end of August 2009. As expected, the average rates of return on common stocks have been greater than the returns for the entire classes of investment-grade and HY bonds. But surprisingly, although the risk associated with common stocks (as measured by the standard deviation of their annual returns) has been large, the highest risk measures have been reported for two categories of HY bonds: Caa-rated bonds and defaulted bonds.[7] At the same time, both of these high-risk asset classes have provided investors with relatively low returns. This combination of high risk and low return goes a long way in explaining another puzzle: while the standard deviation of HY bond annual returns has been more than double that of aggregate IG bonds—15.4% versus 5.9%—the average returns have been roughly the same, both falling between 8% and 9%. (The major differences in risk between in IG and HY bonds can be seen clearly in Exhibit 4, which shows that while IG bonds experienced two years with small negative returns, HY bonds had five years of negative returns as well as three years of strong positive returns following each of the last three recessions).

Like Caa-rated and defaulted issues, moreover, B-rated issues have also surprised researchers by providing lower average returns than less risky Ba-rated issues. And thus, while the risk measures for rated HY bonds have all increased with lower bond ratings as expected, the average annual rates of return provided by the different classes of HY bond have been the *complete opposite of expectations*—with Ba-rated producing the highest average returns followed by B-rated bonds, and

7. These overall results in a scatter plot of the geometric mean annual returns and standard deviation of returns indicate that most asset classes plot very close to a risk-return regression line that excludes the Caa-rated and defaulted bonds.

Exhibit 7 **Correlation Coefficients Among Monthly Rates of Return: Equity Indexes, Investment Grade Bond Indexes, Composite High Yield Bond Index, High Yield Bonds by Rating Categories, and Defaulted Bonds, Jan. 1985–Aug. 2009**

	Stock		Investment Grade Bonds				High Yield Bonds			
	SP500	RUS 2000	BC AGGR	BC TSY	BC CORP	BC Baa	BC HY-COM	BC HY-Ba	BC HY-B	BC HY-Caa
Stock										
SP500	–									
RUS 2000	0.814*	–								
Investment Grade Bonds										
BC AGGR	0.206*	0.074	–							
BC TSY	0.064	-0.059	0.950*	–						
BC CORP	0.324*	0.224*	0.905*	0.770*	–					
BC Baa	0.377*	0.305*	0.837*	0.676*	0.964*	–				
High Yield Bonds										
BC HY-COM	0.566*	0.611*	0.280*	0.056	0.521*	0.631*	–			
BC HY-Ba	0.542*	0.561*	0.407*	0.183*	0.628*	0.741*	0.930*	–		
BC HY-B	0.555*	0.600*	0.247*	0.027	0.482*	0.584*	0.984*	0.891*	–	
BC HY-Caa	0.502*	0.562*	0.109	-0.085	0.336*	0.451*	0.904*	0.770*	0.871*	–
Defaulted Bonds										
DEF BOND	0.402*	0.477*	-0.077	-0.246	0.173*	0.281*	0.665*	0.552*	0.658*	0.691*

*Significant at the 5% level.

NOTE: The Altman Defaulted Bond index statistics excludes 1985 & 1986 monthly returns.

the Caa-rated bonds experiencing the lowest returns. The large annual variation in returns is especially visible in the case of Caa-rated bonds, which, as can be seen in Exhibit 5, experienced negative returns in eight, or nearly a third, of the years examined.

These differences between the risk of HY and IG bonds, and among the different ratings classes of HY bond, are also clearly reflected in differences in their cumulative default rates. As reported in Exhibit 6, the 10-year cumulative default rate for IG bonds has ranged from 0.5% for Aaa-rated bonds to 4.7% for Baa-rated bonds, with an overall average cumulative default rate for IG bonds of 2.1%. By contrast, the cumulative default rate for HY bonds has ranged from 17.4% for Ba-rated bonds to 52.2% for Caa-rated bonds, and an overall average cumulative default rate for HY bonds of 26.6%.

Analysis of Correlations

One important consideration for portfolio managers is the correlation of returns among different asset classes. As summarized in Exhibit 7, the strongest correlations are those among different IG bond series, correlations that have fallen within a narrow range from about 0.84 to 0.95. By contrast, the correlation between the S&P 500 and IG bonds has been low (0.206, and barely significant in a statistical sense), whereas the correlation between HY bonds and the S&P 500-HY bond has been considerably higher (.57), and statistically significant. The strongest correlation has been that between the returns on HY bonds and the returns on Russell 2000 small cap stocks (0.61). At the same, the returns on defaulted bonds have turned out to have no detectable correlation with any investment grade bond index, though strong (and significant) correlations with large-cap and small-cap stocks.

As for correlations among bond classes with specific ratings, the correlation between Treasury bonds and Baa bonds has been estimated at 0.68, as compared to correlations between Treasuries and HY bonds that fall to about 0.18 in the case of Ba bonds, 0.03 for B-rated bonds, and -0.09 for Caa-rated bonds. In sum, the correlations between stocks and all credit classes of HY bonds have been significantly higher than the correlations of stocks with either investment-grade or Treasury bonds.

Another important concern of investors is the stability of such correlations over time. For example, if a total-period correlation is 0.60, it makes a difference if the annual correlations over time range from 0.50 to 0.70, or from 0.20 to 0.90.

Exhibit 8 **24-Month Moving Correlations: S&P 500 Stock, Investment Grade Bond, and High Yield Bond Returns (Dec. 1986–Aug. 2009)**

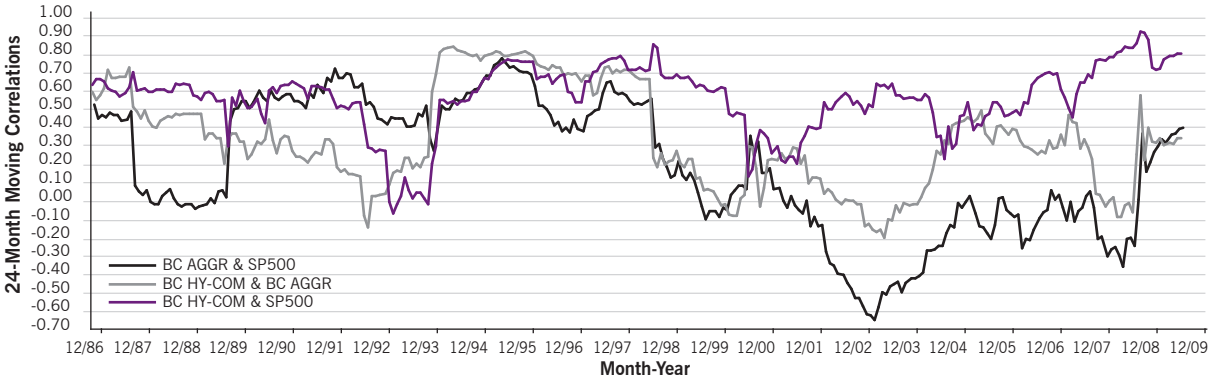
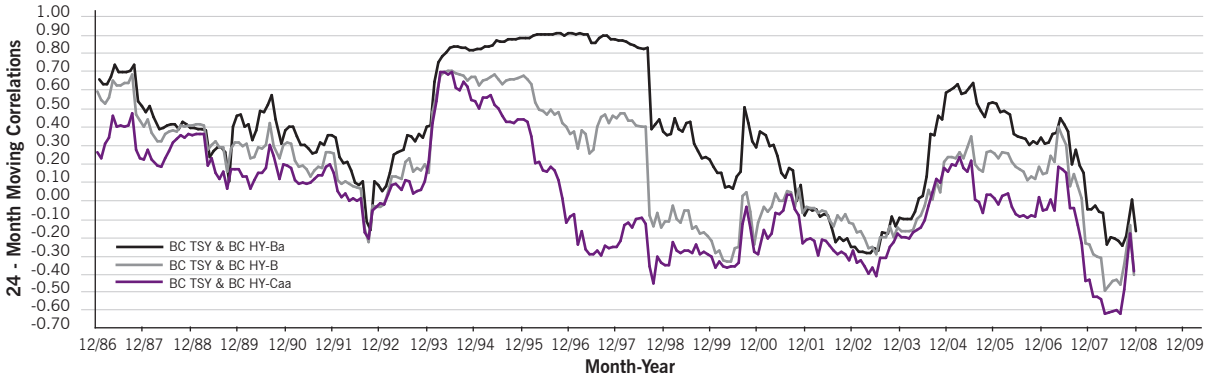


Exhibit 9 **24-Month Moving Correlations: Lehman Brothers Treasury Bond Returns Versus Ba, B, and Caa High Yield Bond Returns (Dec. 1986–Aug. 2009)**

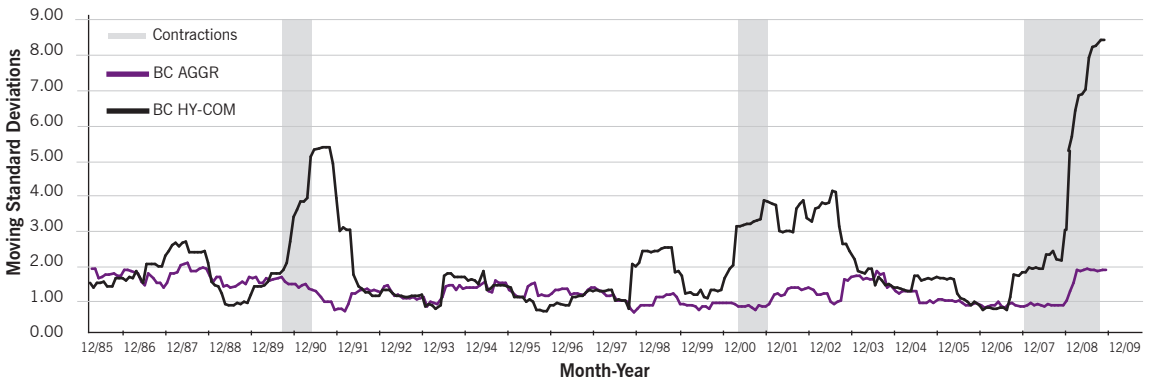


The most striking characteristic of the 24 month moving average correlations in Exhibits 8 and 9 is the substantial variability of virtually all the series. As shown in Exhibit 8, which reports the time series of moving average correlations among stocks, investment grade bonds, and HY bonds, the *most volatile* correlations over time have been those between common stocks and investment grade bonds, ranging from almost 0.80 in late 1995 to about -0.70 in early 2003. Perhaps even more surprising, these correlations have been generally negative during a period that stretches from early 2002 until late 2008. By contrast, the *least volatile* and highest correlations have been those between HY bonds and common stocks (over 0.90 in late 2008). As for the relationship between HY and investment grade bonds over time, the correlation has been so variable that there appears to be no statistically detectable pattern.

As reported in Exhibit 9, the correlations between Treasury bonds and different ratings classes of HY bonds have ranged over time from almost 0.90 to about -0.63, but with a pattern of differences that is consistent with expectations. For example, the correlations between Treasuries and Ba rated bonds have almost always been positive (reaching a high of .90 during the period 1996-1997). During the early years of the series (1987-1998), the Treasury-B rated bond correlations were close to the Treasury-Ba bond correlations, but after the 1998 Russian bond default event, these correlations have been considerably more variable. Finally, the Treasury-Caa bond correlations have been the most volatile, declining dramati-

8. These differences among the correlations over time by ratings supports the idea of some segmentation between HY bonds with different ratings.

Exhibit 10 **12-Month Moving Standard Deviations: Aggregate Investment Grade Bond, SP500, and Composite High Yield Bond Monthly Returns Versus NBER Contractions (Dec. 1985–Aug. 2009)**



cally starting in 1995 and mostly negative since 1997.[8]

We also examined the intertemporal correlations between common stock and the rated HY bonds, but have not reported the results. What we will note is that these correlations have become much less volatile than in the past, thus providing still more evidence of a much stronger and more consistent relationship between HY bonds and stocks than between HY and IG bonds.

Changes in Risk over Time

Just as correlations change over time, so do standard deviations. During normal or "non-crisis" periods, the volatility of IG and HY bonds, as can be seen in Exhibit 10, is fairly similar and stable at 1-2%. In sharp contrast, the HY bond market experienced *an explosion* in volatility during periods of economic uncertainty—over 5% in 1991, about 4% in 2002, and over 8% in 2009. This pattern not only confirms the common perception that HY bonds are riskier than IG bonds based upon measures of volatility over long time periods, but also demonstrates that virtually all of the difference in risk shows up during periods of economic and political uncertainty.

As shown in Exhibit 11, the moving standard deviation for common stocks and HY bond rating classes indicates that the volatility of Ba bonds exceeded 2% only four times during the 23 years of the series. B-rated bonds experienced volatility similar to that of Ba bonds except for short periods—notably, when it exceeded 4% in 1991 and 8% in 2009. In contrast, the Caa-rated bonds experienced volatility of almost 9% in 1991, between 5% and 7% from late 2001 through 2003, and 12% in 2009. These results make clear that the major source of volatility for the HY bond universe has been the Caa-rated bonds, which during several periods experienced greater volatility than even common stocks.[9]

The HY Bond Credit Risk Spread

The HY bond credit risk spread (CRS) is measured by subtracting the yield to maturity for 10-year Treasury bonds from the yield to maturity of the HY bond index. Yield spreads are a common metric used by bond analysts and portfolio managers to differentiate between bonds in different sectors and reflect the concern of investors about both the possibility of default and the liquidity risk of the bonds. In this section, we examine the monthly time series of the CRS series from the start of 1987 through the end of August 2009.

Statistical Characteristics

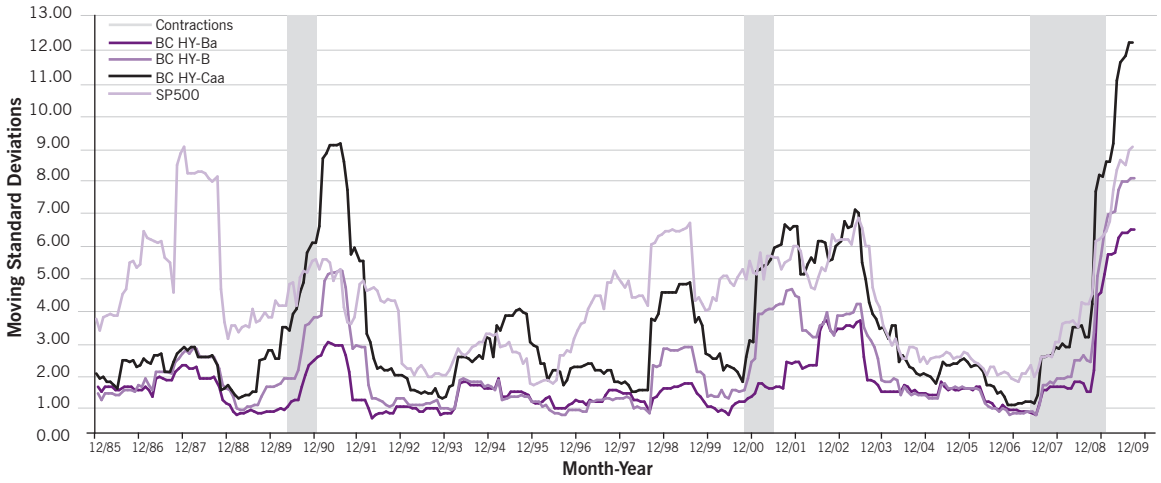
The CRS time series is plotted in Exhibit 12 with the NBER economic contraction periods designated along with lines that indicate the spread mean, and plus and minus two standard deviations.[10] What's immediately clear from the exhibit is that the distribution for the CRS series is far from normal. Instead there is a significant positive "skewness," with two peaks reaching levels clearly more than two standard deviations above the mean, and virtually no monthly observations more than one standard deviation below the mean.

As expected, the business cycle has a major impact on the CRS, with spreads consistently reaching their peak values during or shortly after the three recessions. And, indeed, the most striking observation in Exhibit 12 is the substantially larger increase in the CRS during the height of the financial

9. The time series of volatility was also examined relative to periods of easy monetary policy identified as periods when the Federal Reserve was reducing or had reduced the discount rate. This measure of monetary policy has been justified in a number of studies (see Jensen, Johnson and Mercer (2000)). The results indicated that the periods of easy monetary policy were very frequent over our study period and covered all the recessions, but also many months that were economic expansions and the relationship between monetary policy and changes in volatility were not meaningful so we have not included these exhibits.

10. Again, we examined the CRS series relative to periods of easy monetary policy and the pattern likewise implied that there would not be a significant relationship because of the preponderance of easy money periods.

Exhibit 11 **12-Month Moving Standard Deviations: Ba, B, and Caa High Yield Bond and SP500 Monthly Returns Versus NBER Contractions (Dec. 1985–Aug. 2009)**



crisis in 2008 than in prior recessions. In earlier recessions, the peak CRS was slightly above or below two standard deviations above the mean. In December 2008 the CRS reached almost 2,000 basis points, or almost *five* standard deviations above the mean. Although the CRS may not follow a normal distribution, it seems safe to say that such a CRS value would be considered highly improbable.

Credit Risk Spreads by Rating

The time series of credit spreads by bond rating shown in Exhibit 13, together with the means and standard deviations of each group provided in Table 1, leads to three observations. First, B-rated bonds have had spread characteristics remarkably similar to those of the composite HY bond series. But this is not surprising since a B rating has been both the mid-value and the dominant segment of the HY bond universe during this time period. Second, the range of mean values and standard deviations for the three ratings has been quite large. Third, the standard deviation for Caa-rated bonds has been more than twice that of the B-rated bonds and over three times that of the Ba-rated bonds. It appears that the market is clearly aware of the high risk of Caa-rated bonds and requires a significant CRS to accept this risk—especially during recessions, when the Caa spread, as shown in Exhibit 13, reached peaks of almost 2,900 basis points in both 1990 and 2008.

Credit Risk Spreads and Bond Default Rates

To the extent CRS provide investors with compensation for credit risk and losses resulting from defaults, higher CRS should be associated with higher default rates. As shown in Exhibit 14, there has been a strong correspondence between changes in the monthly composite HY bond CRS series and the percentage of HY bonds defaulting in the previous 12 months. Specifically, during the 1990-1991 and 2001-2002 recessions, when the CRS peaked at about 1,000-1,200 basis points, the peak in default rates also proved to be about 10-12%. And the correlation between the two series for the period 1987-2007 was estimated to be 0.77.

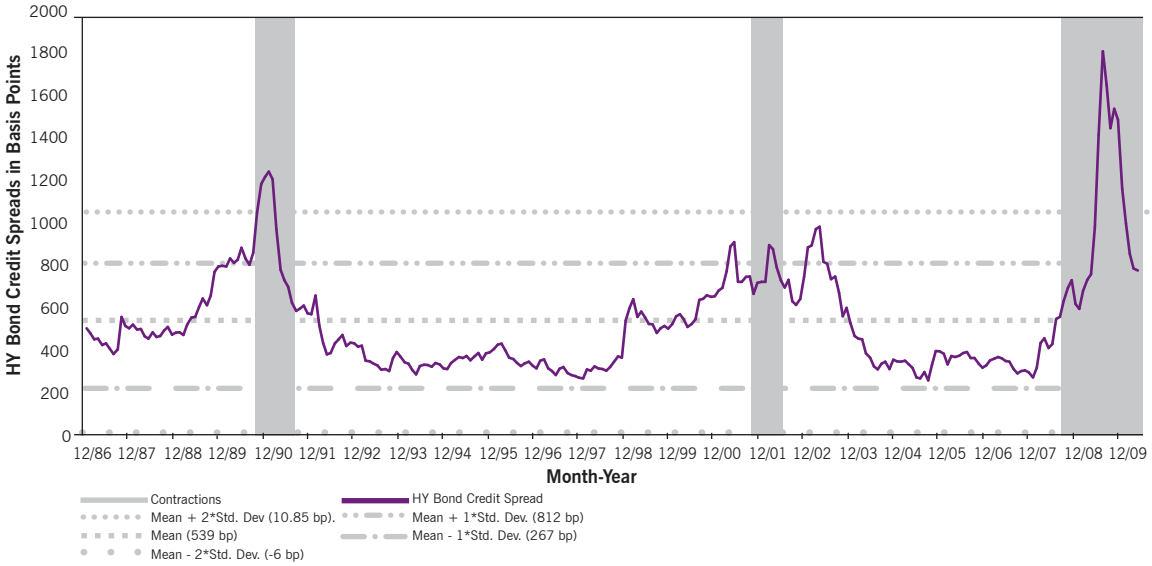
But this relationship appeared to have changed dramatically starting in mid-2007 when the CRS reached a low of about 260 basis points, then rose to 700 basis points by June 2008, followed by a rapid increase to a peak of almost 2,000 basis points in November, 2008. During this period when the CRS was reaching its historic peak, the default rate (as shown in Exhibit 15) went from below 1% in late 2007 to only 4.34% at the end of 2008, which is slightly *below* the total period mean value of 4.9%. Not only did the default rate seriously lag behind the rapid increase in the CRS series in late 2008, but during the first three quarters of 2009, the CRS series experienced a sharp reversal, plummeting from about 2,000 bps to under 800 bps in August 2009. During this same period, the default rate was *increasing*, from 4.50% in December 2008 to over 12% in August 2009. This abrupt reversal in both series resulted in the lines in Exhibit 14 crossing in early 2009.

In sum, there was clearly a major disconnect in 2008 between default rates and the CRS on HY bonds. Notably, although the actual default rate at the end of 2008 was only about 4%, investment firms such as Moody's (2009) and Standard & Poor's (2009) were then projecting default rates for 2009 in excess of 13%. Moreover, this outlook for defaults was consistent with the historical pattern during 1990-1991 and 2001-2002 (evident in Exhibit 15), in which the peak in default rates occurred shortly after the end of recession.

Table 1 **Summary Statistics for CRS**

				Means			
	Means	**Medians**	**Std. Dev.**	**+ 1 S.D.**	**+ 2 S.D.**	**- 1 S.D.**	**- 2 S.D.**
Ba-rating	332	312	139	471	610	193	54
B-rating	523	472	210	733	943	312	102
Caa-rating	965	763	499	1,464	1,963	465	-34
Composite HY	516	449	236	752	988	279	43

Exhibit 12 **High Yield Bond Credit Spreads (Barclays Capital U.S. Corp. High Yield Bond Yield Minus the Ten-Year Treasury Yield) with NBER Contraction Cycle Months Designated, Mean, and Plus and Minus Two Standard Deviations (Jan. 1987–Aug. 2009)**



Why the Broken Relationship?

Given the clear break in the relationship between the spike in the CRS and the default rate, two questions arise. First, why did the CRS spread move so early and so far? Second, why did the default rate series not react sooner?

As discussed in several studies, the CRS is a function of two major risks—default risk and liquidity risk. Default risk has always been the dominant concern and, therefore, the major driver of the CRS. While investors are aware of market liquidity risk—the inability to buy or sell an asset quickly at a price similar to prior prices assuming no new information—the effect of liquidity risk on the CRS has always been minor and detectable mainly only during high default periods. But the experience in 2008 was very different because the "credit crises" that initiated the financial market meltdown also became a "liquidity crisis" for virtually all risky assets except Treasury bonds.

The resulting "flight to safety" went beyond anything since the Great Depression in the 1930s. The desire for Treasuries was so great that investors were willing to accept minimal yields (2 or 3 basis points) or in some cases *negative* yields—in other words, investors and money managers were willing to pay the government to hold their money. As a consequence, the liquidity risk premium increased dramatically for all other asset classes. As one example, even very high quality (A1, P1) 30-day commercial paper with virtually no default risk could not be sold for a couple of months in the fall of 2008.

Thus, in this environment of below average default rates and an extreme flight to safety, it seems reasonable to attribute much of the dramatic increase in yield spreads during 2008 to heightened liquidity risk. In addition, the fact that the increase in the liquidity risk yield premium appeared to be larger for assets with greater credit and default risk suggests

Exhibit 13 **Barclays Capital High Yield Bond Credit Spreads for the Ba, B, & Caa Rating Classes with the NBER Contraction Cycle Months Designated (Jan. 1987–Aug. 2009)**

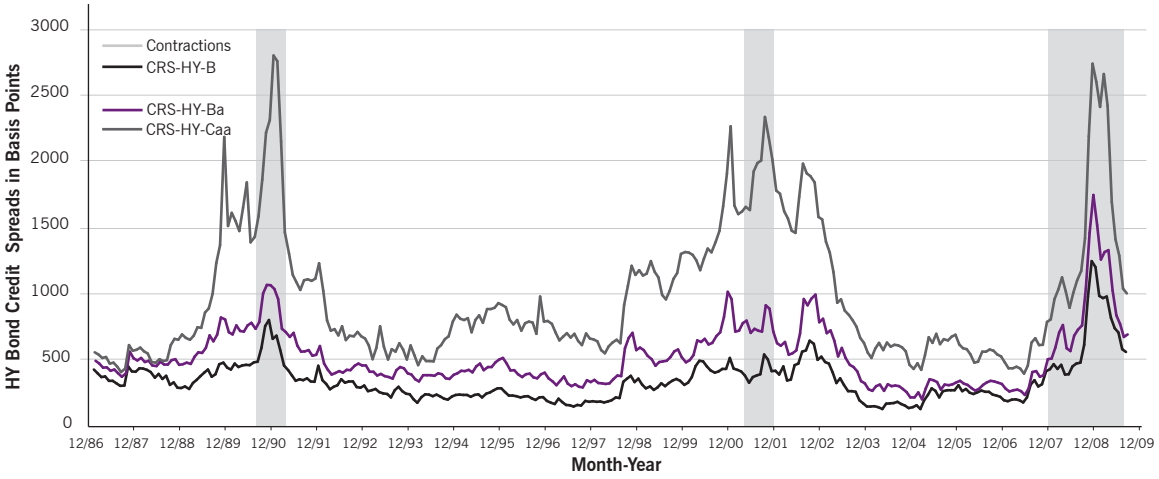
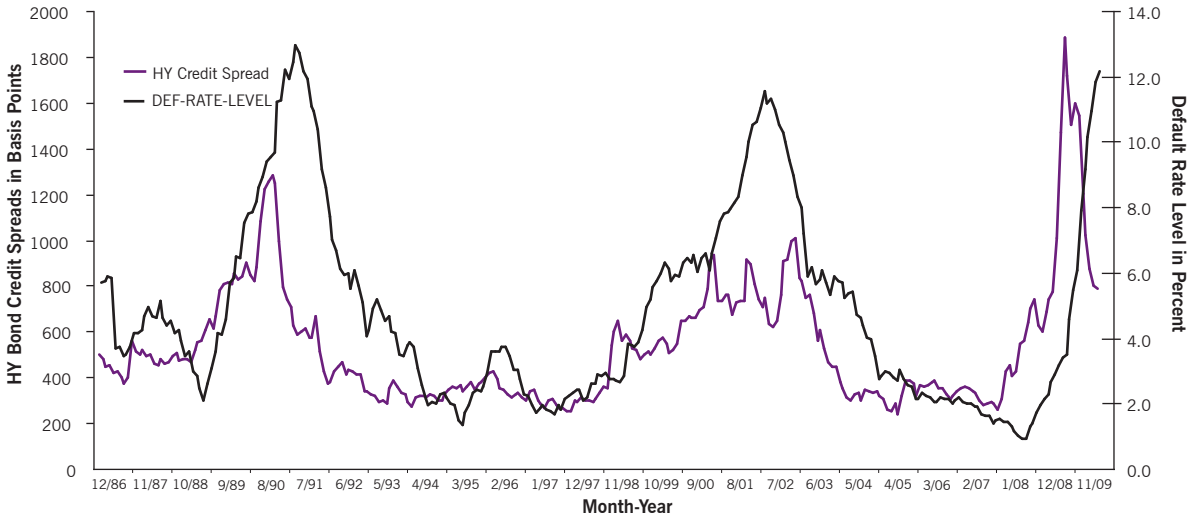


Exhibit 14 **Comparison of the Barclays Capital High Yield Credit Spreads to Moody's Trailing Twelve-Month Speculative-Grade Default Rate (Percent-of-Issuers Basis) Jan. 1987– Aug. 2009**

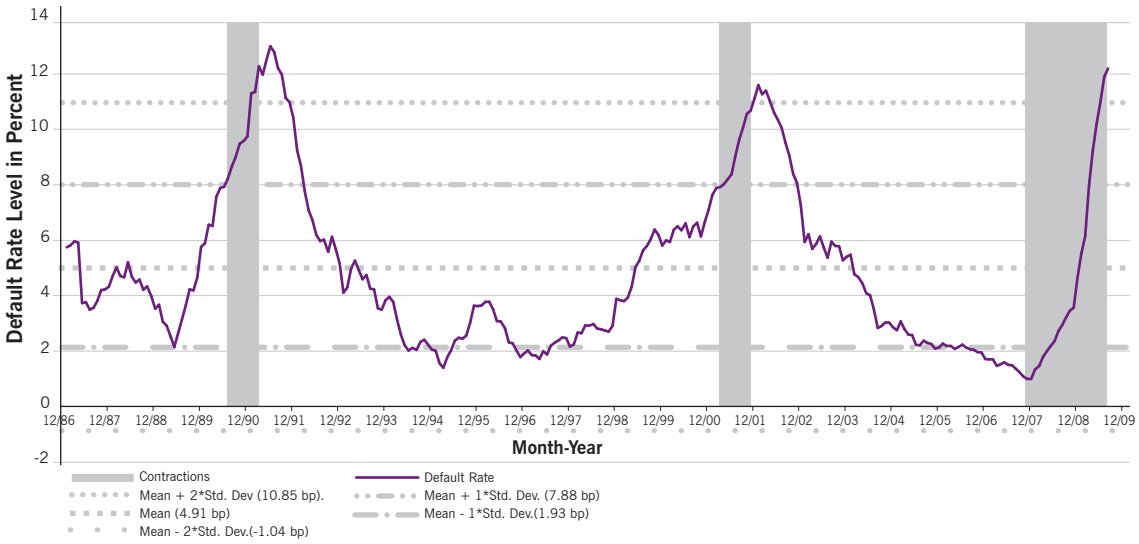


that, at its height, this liquidity risk yield premium was largest for HY bonds. Therefore, the first reason for the break in the relationship between the CRS and the default rate was the extreme flight to safety, which caused a liquidity crisis that in turn caused the CRS to reach historic levels at a time when the default rate was still below its long-term mean value.

The second factor that contributed to the broken relationship was the delayed increase in the default rate—or at least the failure of expected defaults to materialize before or soon after the start of the recession in December 2007. As shown in Exhibit 15, defaults have historically begun to increase several months *before* the beginning of a recession. For example, in the case of the recession that lasted from September 1990 to April 1991, the preceding low point in the default rate series was June 1988—about 27 months before the beginning of the recession. And in the recession that ran from March 2001 to December 2001, the trough in the default rate series was November 1998, or 29 months before the onset of the recession. By contrast, when the most recent recession started in December 2007, the default rate series was at its low point, around 1%—and thus the two series coincided!

What explains the delay in defaults relative to the 2008

Exhibit 15 **Moody's Trailing Twelve-Month U.S. Speculative-Grade Default Rate (Percent-of-Issuers Basis) with NBER Contraction Cycle Months Designated and with Series Mean, and Plus and Minus Two Standard Deviations Jan. 1987–Aug. 2009**



recession? The answer appears to be related to changes in underwriting practices and the structuring of the bonds during the years prior to the credit crises. Particularly during the years 2005, 2006, and 2007, industrial companies were able to issue "cov-lite" bonds with fewer, or less restrictive, covenants and deferred payments of principal. One consequence of such "cov-lite" bonds has been to give many issuers who might have become distressed and defaulted in 2007 or 2008 more time to try to work out their problems. But the consequences of this forbearance are not clear. In many cases, as Steve Kaplan argues in this issue, the flexibility provided by less restrictive covenants and deferral of principal payments could end up increasing the ultimate recoveries, especially for companies with large going-concern values. But for other issuers that are not so fortunate, when the default ends up taking place, the companies could be in substantially worse financial shape and creditors recoveries could be lower because of the failure to take more timely and decisive action.

Recovery Rates Following Defaults

When a bond defaults, its price typically declines because the issuer will not be paying the stated coupon rate (it will trade "flat"), and the firm may go through a reorganization of its business and capital structure.[11] But although the bond price will typically decline, it will not fall to zero, and this post-default price (generally measured 30 days after the default) is referred to as the "recovery rate" (RR); it is the post-default price as a percentage of par value. Although the long-term average RR has been about 38-42%, it is well documented by the rating agencies and others that the RR has been quite volatile over time, and that it varies according to the kind of collateral (secured, unsecured, subordinated) behind the bond.[12]

As reported in Exhibit 16, the mean value for RR over the period 1987-August 2009 was about 42%, ranging from a low of 23% in early 2002 to a peak of 59% in October 2007 (just prior to the official onset of the recession in December 2007). Notably, the troughs in the RRs came just after the recessions in 1990-91 and 2001.

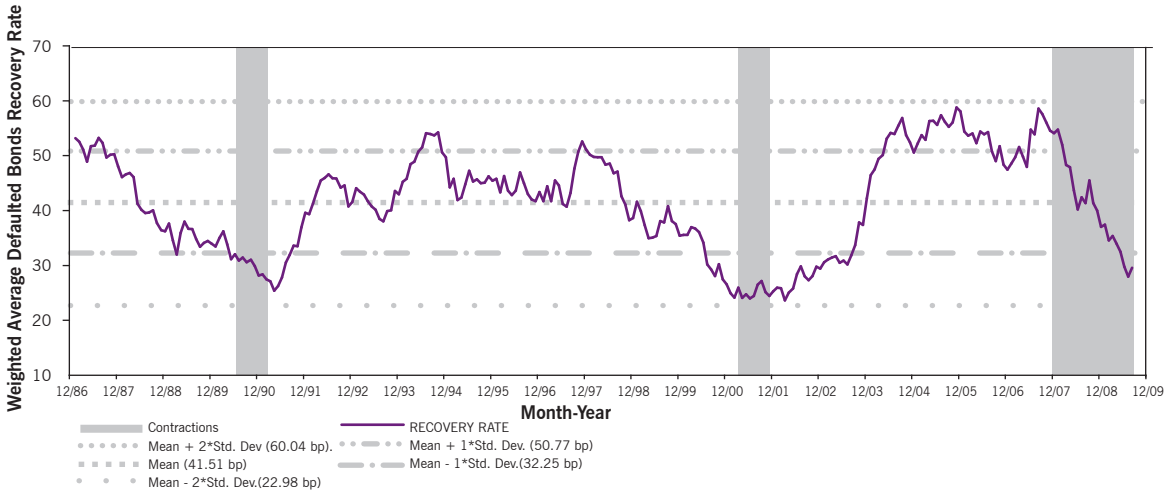
One would expect default and recovery rates to be negatively correlated since both are impacted by the same economic environment. Specifically, during a recession you would expect both an *increase* in the default rate for bonds and a *decline* in the expected price paid for the post-default bonds (i.e., the RR). During an expansion the opposite would be true. These expectations are confirmed by the plot of the default rate (DR) and the recovery rate (RR) time series shown in Exhibit 17.

In addition to this significant negative relationship with defaults, the timing of the RR series relative to economic recessions is also worth noting. The troughs in the RR series (shown in Exhibit 16) come shortly after the end of the reces-

11. Altman and Karlin (2009a) note that there are cases when the bond prices increase—typically it is a distressed exchange default.

12. See Moody's (2009), and also Altman and Kishore (1996), Altman, Brady, Resti, and Sironi (2005), and Frye (2000).

Exhibit 16 **Moody's Trailing Twelve-Month Weighted Average Defaulted Bond Prices Per $100 Par (Recovery Rate) with NBER Contraction Cycle Months Designated and with Series Mean, and Plus and Minus Two Standard Deviations Jan. 1987–Aug. 2009**



sions, and thus coincide with the peaks in the default rate. And like the troughs for the default rate, the RR series peaked a number of months (about 20-24) before the onset of recession in both 1990-91 and 2001. In contrast, during the recent recession, the RR series peaked just two months before the official start of the recession in December 2007.

While these results confirm the negative relationship between the default rate and recovery rate, they also highlight the unique results for 2008. As discussed earlier, the consensus is that the slowly evolving default rate series that reached a value of about 12% in August 2009 will continue to grow and reach an eventual record default rate of about 13% by the end of 2009.[13] In addition, if history is a guide to the future, the negative impact of the higher default rates will be compounded by further declines in the RR.[14]

Summary of Historic Changes in the HY Bond Market

The HY bond market experienced strong overall growth from 1986 to 2008 (over 13% a year by issuing volume), but the growth has been cyclical. There has also been a change in the market composition by credit rating, which could imply either *lower* credit risk due to the higher growth rate of Ba-rated bonds or *higher* risk of default in the future because of the record percentage of Caa-rated bonds in August, 2009.

The long-run risk-return performance of HY bonds relative to stocks and investment grade bonds has been consistent with expectations, except for the case of Caa-rated and defaulted bonds, which experienced very high risk but surprisingly low average rates of return. The full period correlations among numerous assets confirmed the historical pattern wherein HY bonds have had a stronger relationship to common stocks (especially small-cap stocks) than with investment-grade bonds. Besides being stronger, the HY bond-common stock relationship has also been relatively stable over time, in contrast to the constantly shifting correlations between HY bonds and Treasury or investment-grade bonds.

Analysis of the volatility of HY bond returns over time provides three significant findings. First, during periods of stability in the economy and financial markets, the volatility of HY bond returns has been *very similar* to that of investment-grade bonds. Second, during periods of political or economic uncertainty, the volatility of HY bonds has become two or three times greater than the volatility of investment-grade bonds, approaching the volatility of common stocks. Third, the main driver of the significant increase in the risk of the aggregate HY bond market during periods of uncertainty appears to be Caa-rated bonds, whose risk pattern is remarkably similar to that of small-cap common stocks.

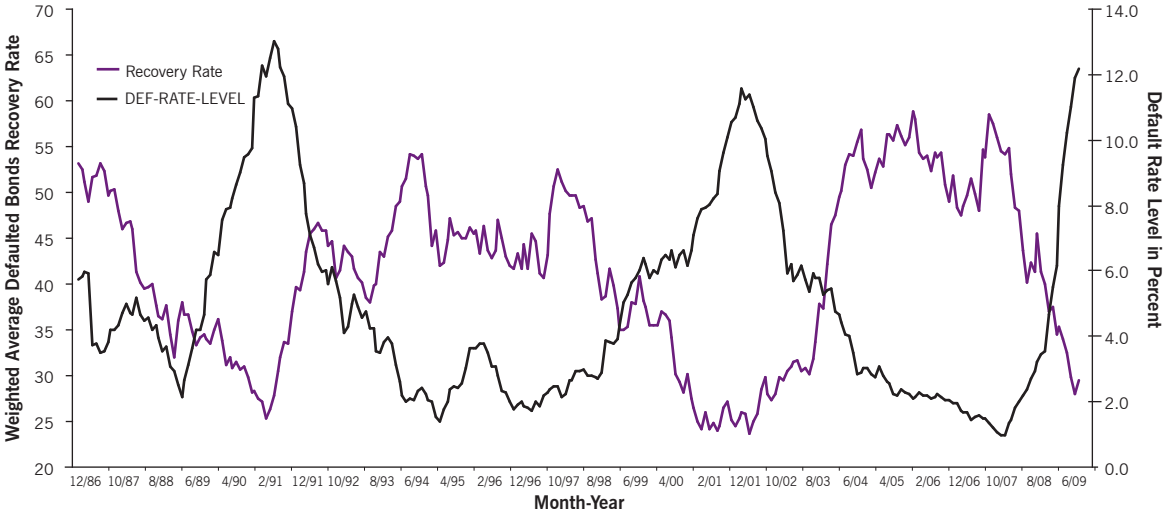
Analysis of changes over time in the volatility of HY bonds indicates a strong relationship with the business cycle (and economic recessions). In contrast, a preliminary analysis suggested an insignificant relationship of HY bond volatility with monetary policy.

Our analysis of the CRS series for the composite HY bond market and for each of its rating categories finds a non-nor-

13. Moody's (2009).

14. For example, based on regression models proposed by Altman and Karlin (2009), a 13% default rate implies a RR of about 21.5% based on the linear model and 26.5% using the curvilinear model.

Exhibit 17 **Comparison of the Moody's Trailing Twelve-Month Weighted Average Defaulted Bond Prices Per $100 Par (Recovery Rate) Versus Moody's Trailing Twelve-Month Speculative-Grade Default Rate (Percent-of-Issuers Basis) Jan. 1987 - Aug. 2009**



mal distribution with significant positive skewness—in other words, periods of exceptionally high spreads (that are not counterbalanced by exceptionally low spreads). We also found significant differences among the CRS distributions for the three HY bond rating categories. Finally, there was a consistently strong relationship of the CRS with the economy, with the three major peaks occurring during or shortly after economic recessions.

Perhaps the most striking finding of this analysis was the recent change in the historical tendency of the CRS series to move together with changes in the default rate. Near the end of 2008, there was a clear breakdown in this relationship when the CRS reached an historic peak of 2,000 basis points, or more than five standard deviations above its long-term mean, while the default rate, at about 4%, was actually below its long-term average. Our analysis provided two reasons for this break in the historical relationship between the CRS and defaults. First was the rapid increase of the CRS caused by the extreme flight to quality during the second half of 2008 that resulted in an abnormal increase in the liquidity risk of virtually all non-Treasury securities, but was accentuated in the case of HY bonds. Second was the use of covenant-lite securities and other sources of financial flexibility that appear to have enabled many HY issuers to at least defer defaults (relative to the business cycle). Also, we confirmed that the recovery rates on defaulted issues have continued their historical negative correlation with default rates during the period 2008-2009.

Implications of the Historic Changes

The continued strong growth of the HY bond market, both in absolute terms (13% a year) and as a percent (25%) of the overall corporate bond market, makes it both a major component of the U.S. fixed income asset class and an important source of capital for U.S. companies in the long-term. At the same time, the cyclicality of this growth, and the tendency for liquidity to fall off during periods of economic uncertainty, can make capital-raising difficult for issuers rated below Ba. This cyclical pattern is evident in the volatility of returns, defaults, recovery rates, and credit risk spreads—all of which reach peaks or troughs during economic recessions. In such an environment, even if it is possible to issue HY bonds, the required spreads make the cost prohibitive. In 2008 spreads reached peaks of 1,250 bps for Ba-rated, 1,800 bps for B-rated, and 2,800 bps for Caa-rated bonds.

This difficulty in issuing new bonds could cause problems for corporate issuers, many of which face major refinancings in the next three- to five-years. In the meantime, the current state of the economy combined with a restrictive financing climate is expected to push the HY default rate from about 4% in late 2008 to an estimated record of about 13% during the fourth quarter of 2009.[15]

For portfolio managers, the likely continuation of the historical relationship of returns on HY bonds with other asset classes implies that HY bonds will continue to behave more like small cap stocks than Treasuries and investment grade bonds. At the same time, because the correlation between HY

15. Moody's (2009).

and IG bonds is only about 0.20-0.30, an investment in HY bonds continues to promise substantial diversification benefits for IG bond investors. Further, while the correlations between HY bonds and common stocks indicate that HY bonds are more like stocks than bonds, the correlation of about 0.60 suggests that modest diversification is still possible with HY bonds and common stocks. Also, the differences in the stock-HY bond correlations for bonds with different ratings points to the likelihood of "segmentation" within the HY bond asset class, with different kinds of bond investors gravitating to the different credit classes of HY bonds. But given our findings that the significant differences in risk between HY and IG bonds occur almost exclusively during recessions, and that most of the dramatic change in risk during recessionary periods is attributable to the Caa-rated segment of HY bonds, HY investors appear to have the option of limiting their risks simply by avoiding the riskier classes of bonds.

The dramatic changes in the CRS over the business cycle imply large changes in the required yield for these securities. In turn, this leads to very large returns, both positive and negative, for HY bonds during and after recessions. For example, the CRS that prevailed in early 2007 (about 250 basis points) was one standard deviation below the long-term mean (the limit during earlier economic expansions, as shown in Exhibit 12). Investors who interpreted this as an indication of very full pricing could have avoided the substantial negative returns (-26%) experienced in 2008. At the same time, knowing that the CRSs in 1990-1991 and 2001-2002 were in excess of 1,000 basis points—and thus over two standard deviations above the long-term mean yield spread—might have been interpreted as a very positive investment environment, thereby enabling HY investors to earn returns of 45% in 1991 and almost 30% in 2003. Knowledge of this pattern could have been especially beneficial in late 2008, when the spread was approaching 2,000 basis points (about five standard deviations above the long-term mean). Since then, returns have exceeded 40%.

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Appendix **Bond and Stock Market Indexes and Abbreviations**

STOCK MARKET INDEXES	
SP500	Standard and Poors 500 Total Return (with dividends) Index
RUS 2000	Russell 2000 Stock Index (with Dividends)
INVESTMENT GRADE BOND INDEXES	
BC AGGR	Barclays Capital U.S. Aggregate Bond Index
BC TSY	Barclays Capital U.S. Treasury Bond Index
BC CORP	Barclays Capital U.S. Corporate Bond Index
BC Baa	Barclays Capital U.S. Credit Baa Bond Index
BARCLAYS CAPITAL HIGH YIELD INDEXES	
RATING CATEGORY:	
BC HY-COM	Barclays Capital U.S. Corporate High Yield Index
BC HY-Ba	Barclays Capital Ba U.S. High Yield Index
BC HY-B	Barclays Capital B U.S. High Yield Index
BC HY-Caa	Barclays Capital Caa U.S. High Yield Index
DEFAULTED BOND INDEX	
DEF BOND	Altman Defaulted Bond Index

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