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by Eric S. Rosengren

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The success in marketing original issue high-yield bonds has generated
significant interest in their default experience. Studies comparing defaults
to the par value of outstanding issues such as Altman (1987), Altman and
Nammacher (1985), and Weinstein (1987) have found relatively low default
rates. However, these studies understate default rates because of the rapid
increase in the par value of outstanding issues and because cumulative default
rates increase with years from issuance. Two recent studies by Altman (1989)
and Asquith, Mullins and Wolff (AMW) (1989) have corrected these problems by
using aging analysis to follow rated nonconvertible high-yield bonds over
time; they find cumulative default rates for such bonds 10 years after
issuance exceeding 30 percent.

This study extends the literature on high-yield default rates to
convertible and nonrated securities, not examined in previous studies. The
high-yield market can be partitioned into rated nonconvertible, rated
convertible, nonrated nonconvertible, and nonrated convertible securities.
Other things equal, one would expect higher default risk to be associated with
higher yields; however, other things are not equal. For example, securities
may have high yields because of differences in liquidity or differences in
conversion options. Therefore, yields reflect more than just expected default

risk; they also incorporate premiums for other characteristics of individual securities.

When the securities are partitioned by rating and convertibility, the results of this paper show that the cumulative default rates are lower for rated convertible securities than for rated nonconvertible securities. Because investors value convertibility, convertible bonds carry substantially lower coupon rates than nonconvertible bonds. These lower coupon rates may reduce the likelihood of an issue defaulting.

In addition, this study examines nonrated securities. Many securities are nonrated because the graduated fee structure charged by rating agencies makes ratings prohibitively expensive for smaller issues. Despite some potential biases that are discussed below, the default rate on nonrated convertible bonds is significantly less than that of rated nonconvertible securities, and the default rate on nonrated nonconvertible bonds appears to be less than that for rated nonconvertible securities.

The next section of the paper discusses the data and shows that the default rates for rated nonconvertible securities are higher than those for rated convertible, nonrated convertible, and nonrated nonconvertible securities. Each category of security is further examined for explanations for lower default rates, in Sections II through IV. Section V estimates a logit model that shows that default differences based on security characteristics persist even after controlling for coupon rates and size. Section VI summarizes the results.

I. Data and Methodology

This study examines all original issue junk bonds issued between 1978

and 1988.[1] The starting date was chosen because the volume of issues prior to 1978 is relatively small, with total rated high-yield bonds issued in any year prior to 1978 not exceeding $1 billion.

The initial list of high-yield bonds was compiled from lists maintained by IDD Investment Services and the Federal Reserve. (See the data appendix for details on the data files.) From this list, securities are dropped if they are found to be investment-grade. Rated securities are dropped if they are rated above BB+ by Standard & Poor's or above Bal by Moody's. For nonrated securities, the firm or the underwriter was contacted to verify its status as below-investment-grade. Where information on a security cannot be verified, the security is dropped from the sample and is not included in any of the tables.

The status as of December 31, 1989 of the sample of below-investment-grade bonds is then identified. Bonds are classified as defaulted, exchanged, called, or outstanding. Defaulted bonds are any that miss a coupon payment or whose firm declares bankruptcy. Exchanged bonds replace original bonds and these are followed to see if their status changes. If an exchanged bond is neither called nor defaulted, it is classified as outstanding.

The primary sources for the status of rated bonds are Standard & Poor's and Moody's publications. The few discrepancies for rated bonds were resolved by contacting the underwriter or issuing firm. For unrated securities, the current status of unrated bonds initially is compiled from the National Bond Summary, default lists from underwriters, and bankruptcy filings with the

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[1]As with AMW (1989) and Altman (1989), this study excludes "fallen angels," securities that have been downgraded to below-investment-grade status.

Securities and Exchange Commission (SEC). The status for all unrated securities is then verified with either the issuing firm or the underwriter. Two hundred and eighty-eight bonds were dropped from the initial list, either because they were investment-grade securities (179) or because we could not verify that they were below-investment-grade securities or determine their default status (109)[2] --leading to potential biases, as discussed below.

This laborious process is necessary because of the lack of a centralized market and of information sources. To check for similarity of results, we compare our summary statistics for rated nonconvertible securities to those of AMW (1989) and obtain similar results.[3]

Table 1 shows the new issues of high-yield bonds from 1978 through 1988. The table partitions the high-yield market into four categories, based on convertibility and whether the issue was rated. Rated nonconvertible securities comprise 77 percent of the market value and 52 percent of the number of bonds issued from 1978 to 1988. However, rated nonconvertible securities were only 50 percent of the value of new securities issued prior to 1984, so that convertible securities and nonrated securities are an important segment of the market, particularly in the early half of the sample.

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[2]From the original list, 148 nonconvertible securities and 31 convertible securities had an investment-grade rating. Information could not be determined for 104 nonrated nonconvertible and 5 nonrated convertible securities.

[3]The number, value, and cumulative default rates for rated non-convertible securities in this study are similar to those in the AMW study. In six of the nine years, our sample has a slightly larger number of bonds, though the small differences in total value suggest that the AMW sample's smaller number likely reflects omissions of relatively small issues. The cumulative default rate for bonds issued in 1978 is 34 percent in our sample, 33 percent for AMW. Other years are generally similar, although our study found somewhat higher default rates for securities issued in the 1980s than did AMW.

One major difference between rated nonconvertible and nonrated or convertible securities is the average size. Nonconvertible securities are of larger average size than convertible securities, and rated securities are of larger average size than nonrated securities.

Table 2 provides the default rates for each of the four categories of high-yield bonds as of the end of 1989. The cumulative default rates for rated nonconvertible securities are much higher than for the other three categories. Rated nonconvertible securities have higher default rates than rated convertible securities in 10 of the 11 issue years between 1978 and 1988. Similarly, the cumulative default rates of rated nonconvertible securities are higher than those for nonrated convertible securities in all 11 years, and higher than those for nonrated nonconvertible securities in all but three years. The cumulative default rates for rated nonconvertible securities are significantly different from each of the other three categories at the 5 percent level using a pairwise t-test.[4] The following sections examine possible explanations for the differences in cumulative defaults among the four categories of high-yield bonds.

II. Differences in Defaults of Rated Convertible and Rated Nonconvertible Securities

Table 2 highlighted the much lower cumulative default rates for rated convertible securities compared to rated nonconvertible securities.

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[4]A simple t-test would not be appropriate because, as AMW (1989) and Altman (1989) have shown, default experiences differ with age. By pairing observations by issue date, a pairwise t-test compares differences in cumulative default while controlling for differences highlighted in the aging analysis.

Misclassifications cannot explain the differences in default rate. Our sample selection process required that neither Moody's nor Standard & Poor's classify the security as investment-grade before it could be included in the sample, thus eliminating misclassifications. Three other explanations are possible: convertible bonds may have fewer of the lowest grade of these below-investment-grade bonds; convertible bonds may be called before they have an opportunity to default; or lower interest expense as a result of the conversion feature may significantly reduce the probability of default.

The highest-rated bond within a category may have a significantly lower probability of default than the lowest-rated bond; however, differences in quality distribution do not explain the differences in default rate. Table 3 provides the rating compositions of bonds issued during the time period that includes most of the defaults, 1978 to 1983.[5] Clearly, differences in quality among below-investment-grade bonds cannot account for the differences between default rates for convertible and nonconvertible bonds. Between 1978 and 1983, 25 percent of the rated convertible securities and only 15 percent of the rated nonconvertible securities had ratings below B. Since securities with a rating below B would be those that the rating agency thought had the highest probability of default,[6] this evidence makes the results even harder to explain because it suggests higher rather than lower expected default rates for rated convertible securities.

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[5]The results of this table are the same if the period is shortened. For example, between 1978 and 1981, 20 percent of the rated convertible securities issued had ratings below B, while only 6 percent of the rated nonconvertible securities had ratings below B.

[6]An alternative hypothesis is that rating agencies are unable to accurately assess default risk in the high-yield market. This hypothesis is explored in Rosengren (1992).

Rated nonconvertible securities have many fewer issues called than do convertible issues. Table 4 provides the number of issues called, outstanding, and defaulted for each of the four categories of securities. For the issue years 1978 to 1987, the percentage of rated convertible securities that were called exceeds that for rated nonconvertible securities. The percentage of called convertible issues is so much greater that, despite the higher cumulative default rates for rated nonconvertible securities in five of the six years from 1978 through 1983, in four of those six issue years rated nonconvertible securities have a higher percentage of issues still outstanding.

A nonconvertible issue is likely to be called if the general interest rate level drops or if the credit risk of the issuer improves sufficiently to permit a lower interest cost for new security issues. An additional factor for convertible securities is that improved firm performance is likely to increase the value of the firm's stock, encouraging the issuer to call the security. Consider the following simple example. Suppose that firms that issue high-yield bonds have a probability of 0.5 of doing well in the short run; if they do well in the short run, they have a probability of 0.5 of doing well in the long run. If they do poorly at any time, they are in default. Further assume that if a firm issuing a convertible bond does well in the first period its bond is called, while a nonconvertible bond remains outstanding. In this example, nonconvertible bonds would default 75 percent of the time while convertible bonds would default only 50 percent of the time. Therefore, some of the differences in default rates may be due to firms that do well at any point in time, retire their convertible bonds, and drop out of the sample.

This hypothesis was further explored by following firms after the convertible security was called. The 130 called rated convertible securities were issued by 111 firms. We followed these firms on Compustat to determine whether they had been delisted. Of the 110 firms whose status could be determined by using Compustat, Standard & Poor's, and Moody's publications, only two had been delisted by the end of 1989, and both were liquidated and had issued only one security. Thus, relatively few firms calling convertible securities in our sample had been delisted at a later date.

Many firms use the retirement of convertible securities to reduce their leverage, thus reducing their probability of bankruptcy. For those called issues listed on Compustat, an examination of the firms' financial positions showed that over 72 percent of the firms had a lower debt/equity ratio at the end of the year following the call, compared to the end of the year prior to the call. Relatively few new long-term issues were found. Most of the firms issued short-term debt, used internal funds, or issued new equity to pay for the retired long-term bonds.

A third possible explanation for the differences between the rated convertible and the rated nonconvertible bonds is the difference in coupon rates. Because investors value the conversion feature, rated convertible bonds have a lower coupon rate than rated nonconvertible securities, other things equal. For a given cash flow, companies will have more difficulty paying the higher coupons, thus increasing the probability of default.[7] Forty-five percent of the rated nonconvertible securities have coupon rates

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[7]While ratings are supposed to control for factors such as coupons that could influence the probability of default, Rosengren (1992) finds that ratings frequently do not fully incorporate bond characteristics that affect the probability of default.

greater than 13 percent, compared to only 3 percent of the rated convertible securities. Those rated convertible securities with coupon rates greater than 10 percent have a default rate that is actually higher than the rate for the total rated nonconvertible group. This is consistent with rated convertible securities having a higher percentage of securities in the lowest-rated categories, as discussed above.

Thus, the much lower default rates for rated convertible than rated non-convertible securities may be due to both the ability to convert in good times and the reduced pressure placed on cash flow by convertible securities, which generally have lower coupons than nonconvertible securities. Both these explanations should be equally applicable to nonrated convertible bonds, examined in the next section.

III. Differences in Defaults of Rated Nonconvertible and Nonrated Convertible Securities

Table 2 showed much lower default rates for nonrated convertible securities than for rated nonconvertible securities. Potential bias introduced by eliminating firms for which we have insufficient information does not explain this difference. For nonrated convertible securities the potential bias is relatively minor; information was not available for five of the 248 securities on the original list. All five of these securities were omitted because we could not verify (with the firm or the underwriter) that they were issued as below-investment-grade securities. However, we could track their current status; two had matured, two were outstanding, and one was called. Thus, if these five securities were all below investment grade at the

time of issue, the default rates for nonrated convertible securities would be slightly lower still.

Misclassification does not explain the lower default rates. The default experiences of the nonrated convertible securities are slightly greater than for rated convertible securities. Thus, given the rigorous screening and the higher default rate compared to rated convertible securities, it is unlikely that default rates for nonrated convertible securities below those of rated nonconvertible securities can be attributed to misclassifications. However, because nonrated convertible ratings do not exist, it is not possible to control for quality differences within the below-investment-grade category that might account for some of the differences in default rates.

The most obvious reasons for a lower default rate are similar to those of rated convertible securities discussed earlier. Convertible securities have lower coupons and many issues are called when firms do well, eliminating securities that might have defaulted in the future if conditions worsened. The percentages of issues called and issues still outstanding are shown in Table 4. In all 11 years, the sum of called and outstanding issues for nonrated convertible securities exceeds that for rated nonconvertible securities. The nonrated convertible securities in the highest coupon category have greater default rates than rated nonconvertible securities, even though they have a much lower percentage of securities with coupon rates at least 13 percent. The default rate for nonrated convertible securities with a coupon rate equal to or greater than 13 percent was 19 percent, compared to 14 percent for rated nonconvertible securities.

In every year, the issues of nonrated convertible securities were of substantially smaller average size than the rated nonconvertible securities

(Table 2). Because rating agencies' charges are structured to be significantly more costly for small issues, many issuers find it too costly to apply for a rating for small issues. This diminishes their liquidity. Not only must investors do the credit evaluation themselves, but also they may not have the same access to information and specialized credit evaluation knowledge possessed by rating agencies. In addition, small issues are likely to find few dealers willing to provide a secondary market. The reduced secondary market and the diminished investor interest as a result of small size and limited information may make small issues sufficiently illiquid that a premium is required. Thus, issues may be classified as below-investment-grade because of illiquidity rather than credit risk, which may account, in part, for their lower default rates.

A final difference between nonrated convertible securities and rated nonconvertible securities is that nonrated convertible issues are more often placed privately. Privately placed bonds may default less frequently because the firms may be monitored more closely by investors.

IV. Defaults of Nonrated Nonconvertible

For completeness we have included nonrated nonconvertible default rates; however, these default rates have a serious potential bias. No information was available on 104 of the 386 issues on the original list, or 27 percent of the sample. Because many issues were small and privately placed, it could not be verified that they were below investment grade and it could not be verified if they had defaulted. If the probability of not being able to verify the status of the bond were independent of default rate, there would be no bias. However, if the securities that could not be traced were more likely to have

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defaulted, then the figures reported in Table 2 for nonrated nonconvertible securities would have a downward bias. While defaults are one possible reason for the lack of information, most of the securities were under $10 million and had underwriters that could not be traced. Other than the potential sample bias, those securities for which information was available may have lower default rates because of the reduced liquidity of small issues and the increased monitoring that occurs with privately placed issues.

V. Logit Analysis

Differences in default experience can be verified statistically by estimating the following logistic model.

$$D_j = a_0 + a_i \sum_{i=1}^{10} d_{ij} + a_{11}RC_j + a_{12}NRNC_j + a_{13}NRC_j + a_{14}C_j + a_{15}S_j + e_j \tag{1}$$

where : D_j = 1 if the security defaulted; 0 otherwise

d_{ij} = dummy for year of issue for security j issued in

year i

RC_j = dummy for rated convertible securities

$NRNC_j$ = dummy for nonrated nonconvertible securities

NRC_j = dummy for nonrated convertible securities

C_j = coupon rate

S_j = issue size in $ millions

Two logit equations are estimated: the first estimates equation 1 excluding size and coupon, and the second estimates equation 1. The first logit equation, whose results are reported in the first two columns of Table 5, estimates the probability of a security defaulting as a function of the

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year of issue and of whether the security is rated or convertible. The logit results indicate that rated nonconvertible securities have a significantly higher default rate than the rated convertible and nonrated convertible securities at the 1 percent confidence level, and than the nonrated nonconvertible securities at the 10 percent confidence level. As expected, the probability of default is related to the year of issue, with earlier years having significantly higher default rates than later years. This provides further statistical evidence that rated nonconvertible securities have higher default rates than rated convertible securities and than those nonrated securities for which information was available.

The third and fourth columns in Table 5 report the results of estimating equation 1 controlling for the coupon rate and the size of issue, two variables highlighted earlier. Though issue size is not significant, coupons are significant and of the correct sign, indicating that higher coupon payments, after controlling for type of security, are associated with an increase in the probability of default. While the magnitudes and significance of the effects on convertible securities drop, as might be expected since most of the lowest coupon issues are convertible bonds, the coefficients are still significant. Because all three dummies for security type remain significant, size and coupon do not account for all the differences in the default experience of the rated convertible, nonrated convertible and nonrated nonconvertible securities relative to rated nonconvertible securities.

VI. Conclusion

The primary finding of this study is that convertible high-yield bonds have a lower default rate than rated nonconvertible high-yield bonds. Lower

coupon rates, and the ability to retire these securities if the firm does well, are the most likely explanations for these lower default rates. We also examine nonrated, nonconvertible securities. The status of 27 percent of these securities could not be verified, a fact that introduces serious potential biases, but among the securities for which information was obtained, the default rates are lower than for rated nonconvertible securities.

Table 1

Annual Issuance of High-Yield Bonds, 1978 to 1988

This table shows the composition of the entire high-yield market by rating category and convertibility, for bonds verified as below-investment-grade at time of issue.

Issue Year	Rated Nonconvertible			Rated Convertible			Nonrated Nonconvertible			Nonrated Convertible		
	Number	Value ($Mil.)	Average Size ($Mil.)	Number	Value ($Mil.)	Average Size ($Mil.)	Number	Value ($Mil.)	Average Size ($Mil.)	Number	Value ($Mil.)	Average Size ($Mil.)
1978	53	1,486	28.0	8	204	25.5	31	923	29.8	9	88	9.8
1979	47	1,313	27.9	13	390	30.0	15	381	25.4	13	97	7.5
1980	39	1,316	33.7	61	2,504	41.0	5	54	10.8	13	180	13.8
1981	26	1,291	49.7	37	1,319	35.6	12	187	15.6	19	277	14.6
1982	42	2,713	64.6	32	1,551	48.5	16	243	15.2	17	334	19.6
1983	65	4,896	75.3	43	2,032	47.3	42	1,347	32.1	38	1,031	27.1
1984	155	11,274	72.7	26	1,318	50.7	41	1,888	46.0	14	244	17.4
1985	142	14,055	99.0	53	3,004	56.7	58	2,441	42.1	36	929	25.8
1986	207	34,157	165.0	125	6,659	53.3	28	760	27.1	51	1,307	25.6
1987	167	29,451	176.4	92	5,634	61.2	19	315	16.6	24	332	13.8
1988	157	31,708	202.0	19	1,621	85.3	15	729	48.6	9	62	6.9

Table 2

Cumulative Default Rates for High-Yield Bonds Issued 1978 to 1988

This table shows the cumulative default rates of high-yield bonds classified by rating and convertibility for which complete information was available. The default status is calculated as of December 31, 1989.

Year	Rated Nonconvertible Number of Defaults	% of Total	Rated Convertible Number of Defaults	% of Total	Rated Nonconvertible Number of Defaults	% of Total	Rated Convertible Number of Defaults	% of Total
1978	18	34.0	1	12.5	2	6.5	2	22.2
1979	13	27.7	4	30.8	3	20.0	1	7.7
1980	14	35.9	7	11.5	2	40.0	3	23.1
1981	9	34.6	3	8.1	2	16.7	4	21.1
1982	12	28.6	2	6.3	2	12.5	1	5.9
1983	22	33.8	4	9.3	6	14.3	3	7.9
1984	20	12.9	0	0	13	31.7	1	7.1
1985	11	7.7	3	5.7	5	8.6	2	5.6
1986	24	11.6	5	4.0	2	7.1	0	0
1987	1	.6	0	0	0	0	0	0
1988	1	.6	0	0	0	0	0	0

Table 3

Initial Ratings of Convertible and Nonconvertible High-Yield Bonds
1978 to 1983

This table provides the initial ratings of convertible and nonconvertible bonds issued between 1978 and 1983. The bonds are classified by Standard & Poor's ratings.

Rating	Rated Convertible 1978 - 1983 %	Rated Nonconvertible 1978 - 1983 %
BB+	10.7	3.8
BB	7.9	10.0
BB–	12.9	10.7
B+	9.6	10.3
B	33.7	49.8
B–	18.0	10.3
CCC+	0	0
CCC	7.3	5.0
CCC–	0	0
Memo: Total Number of Issues	178	261

Table 4

Status of Rated and Nonrated High-Yield Securities Issued, 1978 to 1988

This table provides the current status, as of December 31, 1989, of all high-yield securities issued between 1978 and 1988 for which complete information was available. The cumulative percentages of the called, outstanding, and defaulted issues in a given year sum to 100 percent.

Issue Year	Rated Nonconvertible			Rated Convertible			Nonrated Nonconvertible			Nonrated Convertible		
	Call	Outstanding	Default	Call	Outstanding	Default	Call	Outstanding	Default	Call	Outstanding	Default
1978	22.6	43.4	34.0	62.5	25.0	12.5	16.1	77.4	6.5	44.5	33.3	22.2
1979	34.0	38.3	27.7	61.5	7.7	30.8	40.0	40.0	20.0	53.8	38.5	7.7
1980	28.2	35.9	35.9	55.7	32.8	11.5	20.0	40.0	40.0	30.7	46.2	23.1
1981	19.2	46.2	34.6	48.7	43.2	8.1	50.0	33.3	16.7	31.6	47.4	21.0
1982	35.7	35.7	28.6	50.0	43.8	6.2	50.0	37.5	12.5	41.2	52.9	5.9
1983	10.8	55.4	33.8	20.9	69.8	9.3	23.8	61.9	14.3	18.4	73.7	7.9
1984	16.1	71.0	12.9	34.6	65.4	0	17.1	51.2	31.7	7.1	85.8	7.1
1985	6.4	85.9	7.7	24.5	69.8	5.7	6.9	84.5	8.6	16.7	77.8	5.5
1986	5.3	83.1	11.6	12.8	83.2	4.0	0	92.9	7.1	0	100.0	0
1987	0	99.4	.6	2.2	97.8	0	0	100.0	0	0	100.0	0
1988	0	99.4	.6	0	100.0	0	0	100.0	0	0	100.0	0

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Table 5

Logit Results of Estimating the Probability of Default of High-Yield Bonds

This table reports the results of estimating a logit model on the 2,134 high- yield bonds issued between 1978 and 1988 for which the status as below-investment-grade and defaulted could be verified. The limited dependent variable takes a value of 1 if the bond defaults by December 31, 1989 and 0 otherwise. Three classification dummy variables are included, for rated convertible, nonrated nonconvertible, and nonrated convertible bonds. A negative coefficient on these variables indicates a smaller probability of default relative to rated nonconvertible securities. The first two columns show the coefficients and standard errors of a logit model run on dummy variables for classification and year of issue, while the third and fourth columns present the coefficients and standard errors when the amount of the issue and the coupon on the issue are included along with the dummy variables for year of issue and classification.

Parameter	Coefficient	Standard Error	Coefficient	Standard Error
Constant	-.95***	.25	-1.80***	.38
Rated Convertible	-1.26***	.23	-1.00***	.25
Nonrated Nonconvertible	-.38*	.21	-.37*	.21
Nonrated Convertible	-1.12***	.28	-.96***	.29
1979	.14	.35	.05	.35
1980	.38	.34	.21	.35
1981	.16	.37	-.09	.38
1982	-.21	.36	-.43	.37
1983	-.01	.31	-.07	.31
1984	-.62**	.31	-.64**	.31
1985	-1.25***	.33	-1.36***	.34
1986	-1.14***	.31	-1.19***	.32
1987	-4.41***	1.03	-4.47***	1.04
1988	-4.21***	1.03	-4.32***	1.04
Size			-.09	.89
Coupon			.08***	.03

* significant at the 10 percent level
** significant at the 5 percent level
*** significant at the 1 percent level

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Appendix

The initial universe of high-yield bonds was compiled from lists
supplied by the Federal Reserve and IDD Investment Services. The Federal
Reserve began its data base on high-yield bonds in 1982 based on SEC filings,
rating agency reports, lists from underwriters, and announcements in
newspapers and trade journals. For the period from 1978 to 1981, when the
Federal Reserve did not compile a list, we used a list of high-yield bonds
supplied by IDD Investment Services that was compiled from prospectuses issued
by underwriters. Based on 1982 data for which we had both sources, the two
lists are very similar, with only a few small issues appearing on just one of
the two lists.

As a result of contacts with underwriters, we added 16 issues not
included in the Federal Reserve or IDD data base. We dropped 288 bonds
because they were investment grade or because their status could not be
verified. We dropped 179 rated bonds, 148 rated nonconvertible and 31 rated
convertible, because one of the rating agencies listed the security as
investment-quality. The primary reason unrated bonds were dropped was that
either the status or the investment grade of the security could not be
verified, resulting in dropping 104 nonrated nonconvertible bonds and 5
nonrated convertible bonds.

Table A1 shows the status of each generation of bonds.

Table A1
Aged Defaults for Original-Issue, High-Yield Bonds, by Year of Issue

Defaulted bonds are issues that miss a coupon payment or whose firm declares bankruptcy. A "Years after Issue" value of 1 indicates the bond defaulted the year of issue. Numbers in the n column are the number of defaulted issues of that issue year, listed by years after initial issue, and the corresponding value represents par value in $ millions.

Years after Issue	1978 n	value	1979 n	value	1980 n	value	1981 n	value	1982 n	value	1983 n	value	1984 n	value	1985 n	value	1986 n	value	1987 n	value	1988 n	value
										Rated Nonconvertible												
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	96	1	75	0	0	0	0
2	1	20	0	0	1	7	0	0	0	0	0	0	4	222	3	227	5	885	0	0	1	240
3	1	100	0	0	1	30	0	0	1	60	4	335	7	382	2	225	10	1560	1	400	–	–
4	0	0	7	112	0	0	1	75	2	176	10	690	5	235	4	185	8	1340	–	–	–	–
5	0	0	0	0	1	30	4	390	2	150	3	148	3	239	1	35	–	–	–	–	–	–
6	2	36	2	50	2	77	2	44	0	0	5	305	1	200	–	–	–	–	–	–	–	–
7	4	113	1	60	6	165	0	0	5	448	0	0	–	–	–	–	–	–	–	–	–	–
8	6	160	1	25	1	25	0	0	2	273	–	–	–	–	–	–	–	–	–	–	–	–
9	3	110	0	0	2	53	2	90	–	–	–	–	–	–	–	–	–	–	–	–	–	–
10	1	15	1	61	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
11	0	0	1	20	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
12	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total Defaulted	18	554	13	328	14	387	9	599	12	1107	22	1478	20	1278	11	768	24	3860	1	400	1	240
Total Issued	53	1486	47	1313	39	1316	26	1291	42	2713	65	4896	155	11274	142	14055	207	34157	167	29451	157	31708
										Rated Convertible												
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	1	6	1	10	0	0	0	0	1	35	0	0	1	45	0	0	0	0	–	–
4	0	0	0	0	0	0	0	0	1	25	0	0	0	0	1	30	5	294	–	–	–	–
5	0	0	0	0	1	125	1	20	0	0	2	60	0	0	1	35	–	–	–	–	–	–
6	0	0	0	0	0	0	2	60	0	0	0	0	0	0	–	–	–	–	–	–	–	–
7	1	12	0	0	1	50	0	0	1	15	1	30	–	–	–	–	–	–	–	–	–	–
8	0	0	1	15	3	48	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–
9	0	0	1	10	0	0	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–
10	0	0	0	0	1	25	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
11	0	0	1	150	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
12	0	0	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total Defaulted	1	12	4	181	7	258	3	80	2	40	4	125	0	0	3	110	5	294	0	0	0	0
Total Issued	8	204	13	390	61	2504	37	1319	32	1551	43	2032	26	1318	53	3004	125	6659	92	5634	19	1621

Table A1 - continued
Aged Defaults for Original-Issue, High-Yield Bonds, by Year of Issue

Years after Issue	1978 n	value	1979 n	value	1980 n	value	1981 n	value	1982 n	value	1983 n	value	1984 n	value	1985 n	value	1986 n	value	1987 n	value	1988 n	value
									Nonrated Nonconvertible													
1	0	0	0	0	0	0	0	0	1	25	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	1	20	0	0	0	0	0	0	0	0	2	71	0	0	0	0	0	0
3	0	0	0	0	0	0	2	50	0	0	1	65	2	88	0	0	1	30	0	0	-	-
4	0	0	1	100	0	0	0	0	0	0	1	30	4	290	3	408	1	26	-	-	-	-
5	2	5	1	8	1	3	0	0	1	51	2	60	5	99	0	0	-	-	-	-	-	-
6	0	0	0	0	0	0	0	0	0	0	1	2	2	88	-	-	-	-	-	-	-	-
7	0	0	0	0	0	0	0	0	0	0	1	10	-	-	-	-	-	-	-	-	-	-
8	0	0	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
9	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	0	0	1	67	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Defaulted	2	5	3	175	2	23	2	50	2	76	6	167	13	565	5	479	2	56	0	0	0	0
Total Issued	31	923	15	381	5	54	12	187	16	243	42	1347	41	1888	58	2441	28	760	19	315	15	729
									Nonrated Convertible													
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	1	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	-
4	0	0	1	4	0	0	1	7	1	15	0	0	0	0	1	14	0	0	-	-	-	-
5	0	0	0	0	1	4	1	3	0	0	0	0	1	8	1	5	-	-	-	-	-	-
6	0	0	0	0	0	0	1	8	0	0	2	14	0	0	-	-	-	-	-	-	-	-
7	1	2	0	0	2	100	0	0	0	0	1	5	-	-	-	-	-	-	-	-	-	-
8	1	2	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-
9	0	0	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	0	0	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
11	0	0	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
12	0	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Defaulted	2	4	1	4	3	104	4	68	1	15	3	19	1	8	2	19	0	0	0	0	0	0
Total Issued	9	88	13	97	13	180	19	277	17	334	38	1031	14	244	36	929	51	1307	24	332	9	62

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